DYNAMIC SCREEN PAINTER

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Abstract

Dynamic Screen Painter (DSP) is a Web-based system. The development of this project actually is to provide a dynamic environment to the user where the user can use this system to change or modify web forms inside a database. Web form is a form for the user to key in information into the database or as a "middle man" between the user and the database.

So, through DSP, the users can retrieve the related forms from the database to use or to modify it to suit their demand base on the situation. For example, when there is a new project arise, the existing web form use for collecting a project information may be not suitable anymore so a new form is needed to help in collecting more information, and DSP can help in this problem. For these purpose, DSP provide a few feature for the users such as: change the form layout to make it more arrange, add or delete the field exist on the form for certain purpose and etc. At the same time also, a set of code will be generated automatically base on the form layout and apply in the system once the form is generated so that the form can run immediately in the system. There are 2 main section in the DSP they are the generator part and administrator part.

This project is developed by using ASP.NET with C# and Microsoft SQL Server 2000 as the database. The methodology used to develop this system is the V model.

Eventually, the successful implementation of the DSP will promote a dynamic and easy maintenance environment for the user. Hopefully, it will be a generic application to suit different user.

Acknowledgement

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2.2.3.2 Application Server Tier ... ...

2.9.4 Adobe Photoshop ... ...

4.2.8 Flexibility/Expendability ... ...

5.10 Interface Design ... ...

Chapter 7: System Testing

7.1 Introduction ... ...

8.3.4 Data Validation and Exception Handling 110

8.4 System Limitation 110

8.4.1 No Online Help Facility 110

8.4.2 Browser Limitation 110

8.4.3 Database Not Encrypted 110

8.5 Future Enchancement 111

8.5.1 Provide Online Help 111

8.5.2 Support Other Browser 111

8.5.3 Code Generator 111

8.6 Knowledge and Experience Gained 112

8.6.1 Development tool 112

8.6.2 Proper and Well Planned System Development 113

8.7 Chapter Summary 113

Reference ... ...

Table 3: Name Convert ion for DSP ... ...

Chapter 1 Introduction

1.1 Introduction

A web application is a software application that is accessible using a web browser or HTTP user agent. It typically consists of a thin-client tier (the web browser), a presentation tier (web servers), an application tier (application severs) and a database tier. The application may be spread over multiple presentation tiers and indeed use multiple application tiers, using multiple database sources. Web application may involve many types of data: files, documents, graphics, streaming audio/video, source and binary code, and component libraries.

All of these data is kept under a metadata. A metadata includes information such as the differences between the content and its representation (template, theme, or format), its external (page-to-page) versus internal (intra-page) structure, link relationships, associated tasks or transactions, security rights, tool associations, bill-of-materials (such as how the object was created: tool versions and options or parameters), audit trails, data validation and handler rules, and association to caching algorithms.

Even though development of web application has brought a lot of benefit to the user but since the content inside the applications mostly are static, a few problems have been created when the following issues are considered:

- What to do if current application forms is insufficient to meet the demand and to whom should refer to if want to modify it.

- The business environment change is that mean that the old system also need to change in order to fulfill the business requirement.

Taking these issues into consideration during the creation and design will enable users to create suitable application forms quickly and will results in enhanced work efficiency.

Thus, technology should be adopted to help user overcome those problems. That's why Dynamic Screen Painter (DSP) is developed. DSP is a web-based system that helps users to manage their job more efficient way and save time.

1.2 Typical Problem with Current Web Application

Current web application consists of weakness, some of the major weakness are as below:

a) Difficult to customize

Web application systems nowadays exist in the market as generic type which means that only provide the basic functionality to the users. Different user may have different demand from the system so customization is needed to change the situation. However, to do so it is very time consuming and lost of energy.

b) Static

Everything inside a system is already fix at that position and impossible to do any changes. This will made the users feel bore or even frustrated while using the system when cannot meet their demand.

c) **Cannot meet the market demand**

When time go pass, the user's environment will slowly change and the previous demand have to move a step forward to suit the changes. So does the system, as time keep going, the system no more facilitate the users job. In the end it will be replaced by a whole new system.

1.3 Project Overview

The Dynamic Screen Painter (DSP) is developed with the purpose of providing an easier maintenance, management and dynamic environment for the users. DSP actually is a web application and the main function is to enable the administrator to retrieve information of application form for the database, modify it and apply it back to the system. At the same time also, the new created form will be attached to a set of new generated code which is generated by the code generator inside the system.

Basically DSP comprises 7 modules. They are Database Selection, Form Selection, Template Selection, Form Generator, Code Generator, Access Right Control and Parameter Setting.

There are two types of users: administrator and non-administrator. Both can view forms inside the database. However, full viewing of all the forms inside the database only for administrator right. For non-administrator, their access right level is control by the

administrator and they can only view certain form depend on the job or project that they joined.

DSP focus more on dynamic environment which mean it allow the administrator to modify or changes the web form according to their project demand. This can be done by retrieve the existing form from the database and modify it then summit back again to the system. The system will automatically generate a new form according to the demand of the users and by the same time also, to enable the new form run on the system, the code generator inside the system will automatically generate the code for the form and apply in the system.

1.4 Project Objective

a) Create a dynamic environment

b) Improve work efficiency and productivity

c) Create a system that easy to maintain

d) Reduce the dependency of the system developer

1.5 Project Scope

Project comprises 3 modules as written below:

a) **Code Generator**

Code Generator is the core of the system that responsible for generating the code for new form automatically. This code will enable the new created form run in the

system. There are two types of language the code generator can generate. They are C# to C# and C# to HTML, depends on the users selection.

b) Form Selection

Only certain form is available for modification and not all the form that exist in the database. Form that available for modification usually those that always in use.

c) Template Selection

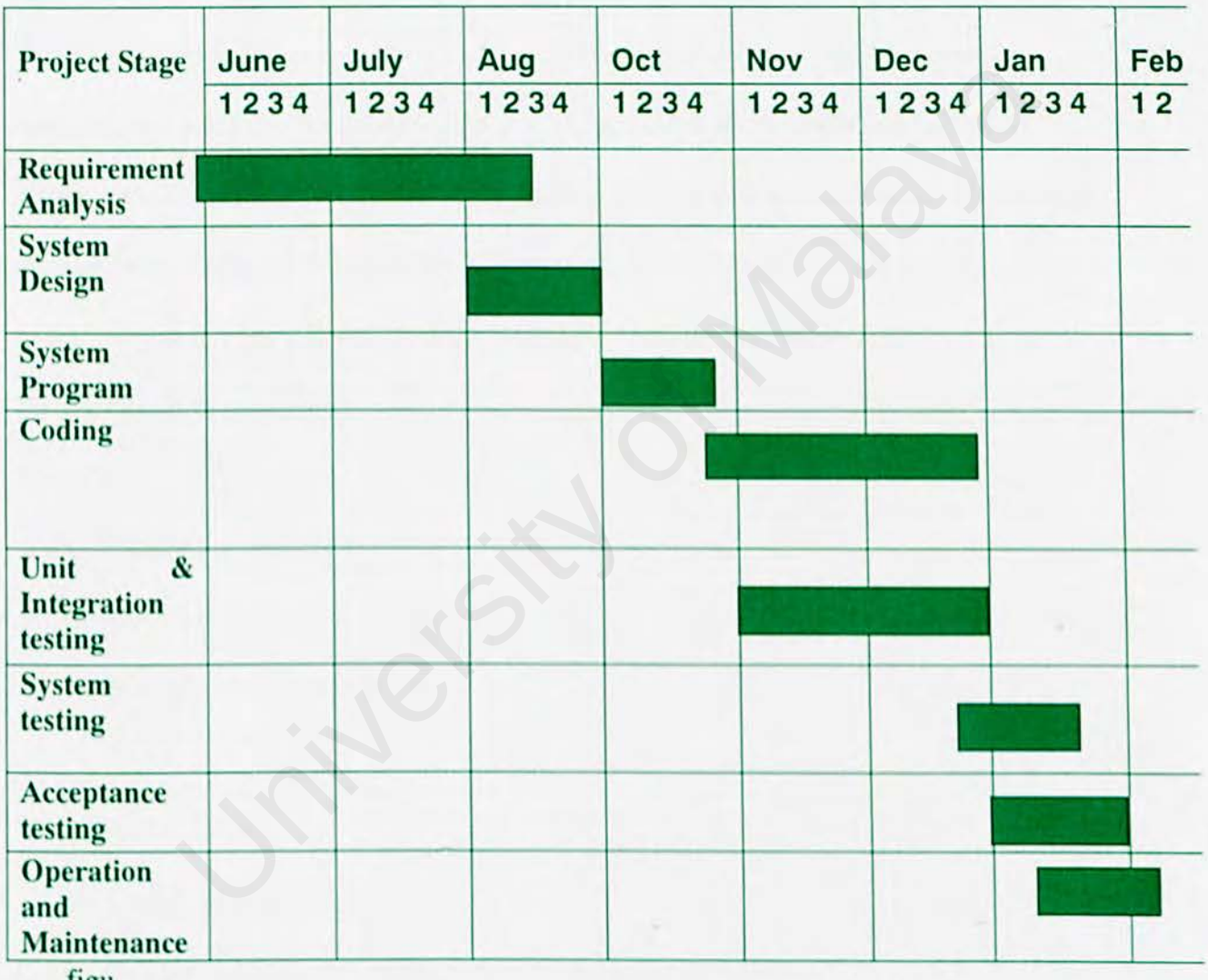
With this module, user can choose the best or suitable layout for the form. A set of template will be provided, user only has to decide the arrangement or display style of the information.

1.6 Expected Outcome of DSP

- Code generator will auto generate the related code for the new created form to "feed" the system
- Template are apply to the new form
- Code generator can generate in two types of code they are C# and HTML
- New form can be generated for user purpose
- User can create a form base on their demand

1.7 Project Schedule

Eight main phases are involved in the development of DSP project. The duration of each phases along with the start and end date of the implementation is detailed in the Gantt chart.



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Chapter 2: Literature Review

2.1 Analysis Study

2.1.1 Case study 1 –rol.tol.com

Introduction:

Rol.tol.com is a company that provides the customer with the web template services. Those who are interest in creating a web site for their business can just contact the company and what the one need to do is just key in all the information that needed to display just like fill in a form. All without an hour the one will have his own web pages to display for his customer information. The template provided also very easy to attract people. Figure 2.1 and Figure 2.2 show the screen shot of the template:

2.1.1.1 Result of case study

Strength:

- Simple and powerful
- Very fast in creating a whole new web sites
- Multiple choice of template

Weakness:

- Unable to customize
- The information to display on the web pages is very limited.

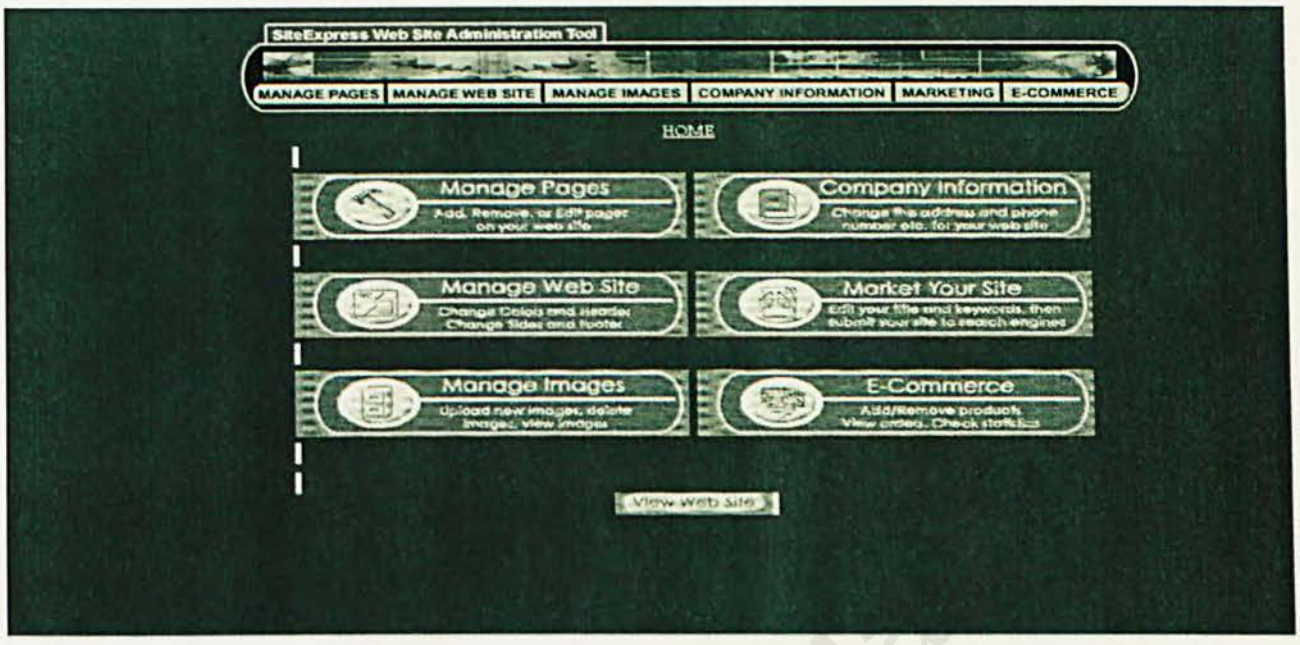


Figure 2.1: The main menu of the template

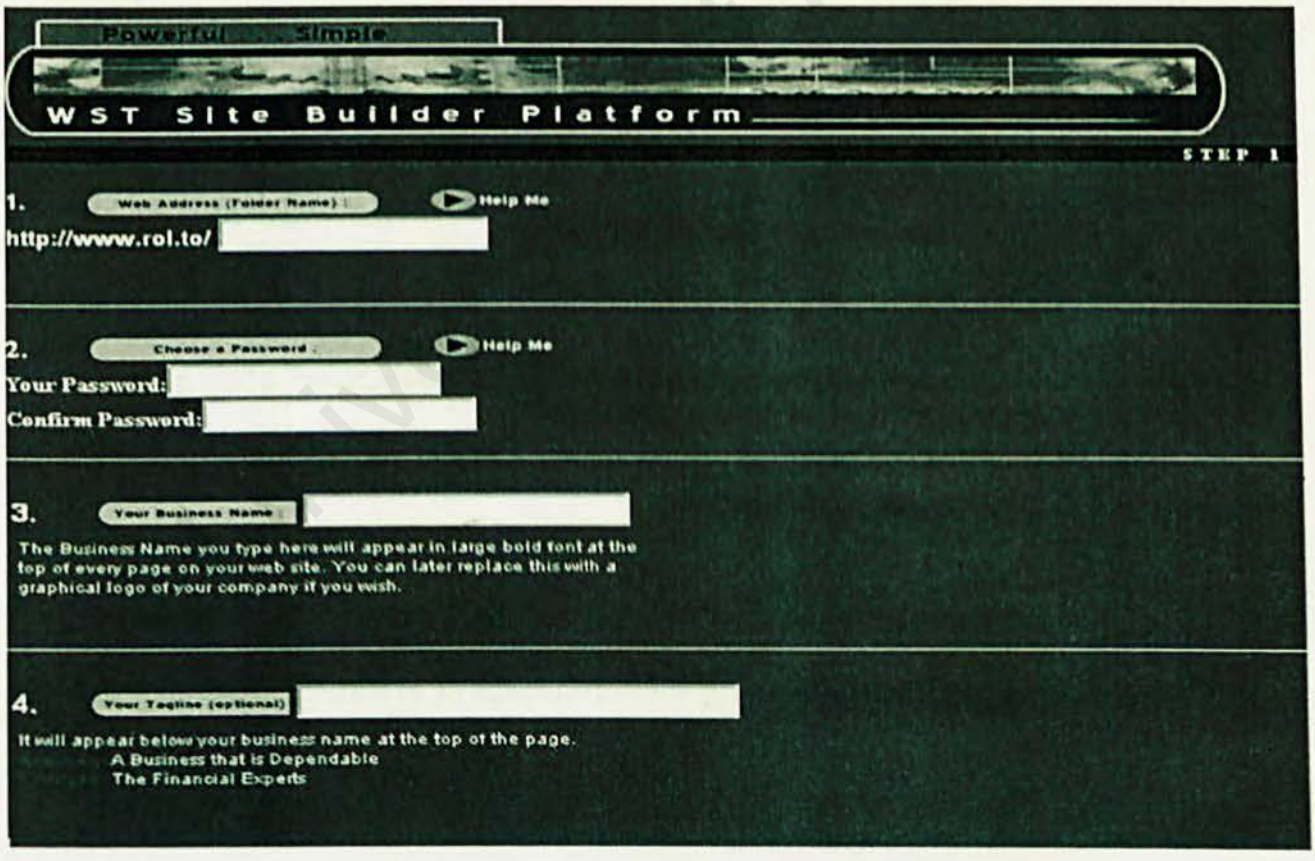


Figure 2.2: The form of the template

2.1.2 Case study 2 – CodeCharge Studio

Introduction:

CodeCharge Studio is a visual application builder and code generator that provides a feature-rich environment for rapid application development for the web. It is the most productive way available today to create powerful, scalable, and secure web applications quickly. Based on a sophisticated code generation engine, CodeCharge Studio opens up new possibilities for web developers by automating the creation of virtually all web application components and by generating robust, professional-level server code in any of the following programming languages: ASP.NET (C# and VB),

- ASP 3.0,
- PHP 4.0,
- Java Servlets 2.2,
- JSP 1.1,
- ColdFusion 4.01, and
- PERL 5.

By leveraging CodeCharge Studio's core technology and development environment, users are able to take advantage of a database-centric model that creates separate HTML and server code. The generated code can be easily modified using the internal code editor, which locks and protects user-modified blocks of code such that improvements and customizations are persistent in all subsequent code generations. Figure and Figure show the screen shot of the form.

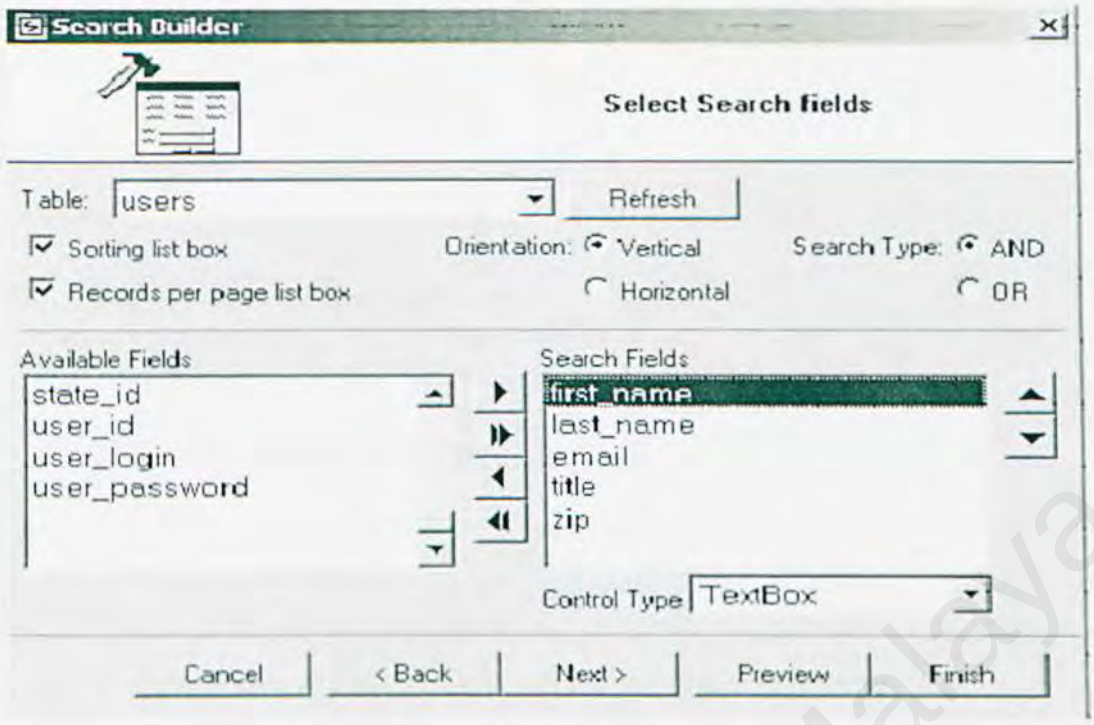


Figure 2.3: The form use in select table in the database to regenerate

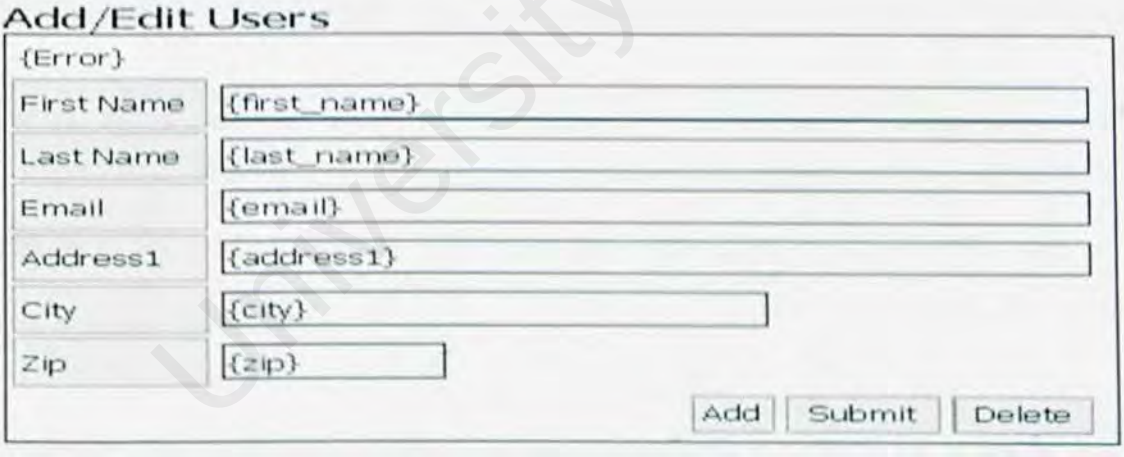


Figure 2.4: The preview of the form after all the selection made

2.1.2.1 Result of case study

Strength:

- Scalable, powerful and secure
- Suitable for wide spectrum of users
- Fully integrated with other components or software
- Multilanguage code generator

Weakness:

- Too many step needed in create a form and due to confusing

2.1.3 Case study 3 – FourGen Case Tool

Introduction:

FourGen Case Tool is a software that almost similar to the CodeCharge Studio either in the objective or the output of the software. The main difference in between these two software is that the step or process during to create an output. Figure show the step or work bench of the software.

2.1.3.1 Result of case study

Strength:

- Multilanguage code generator
- Code design standard
- Version control

Weakness:

- Complex to use
- Suitable only for certain types of users –need certain knowledge to run these software.

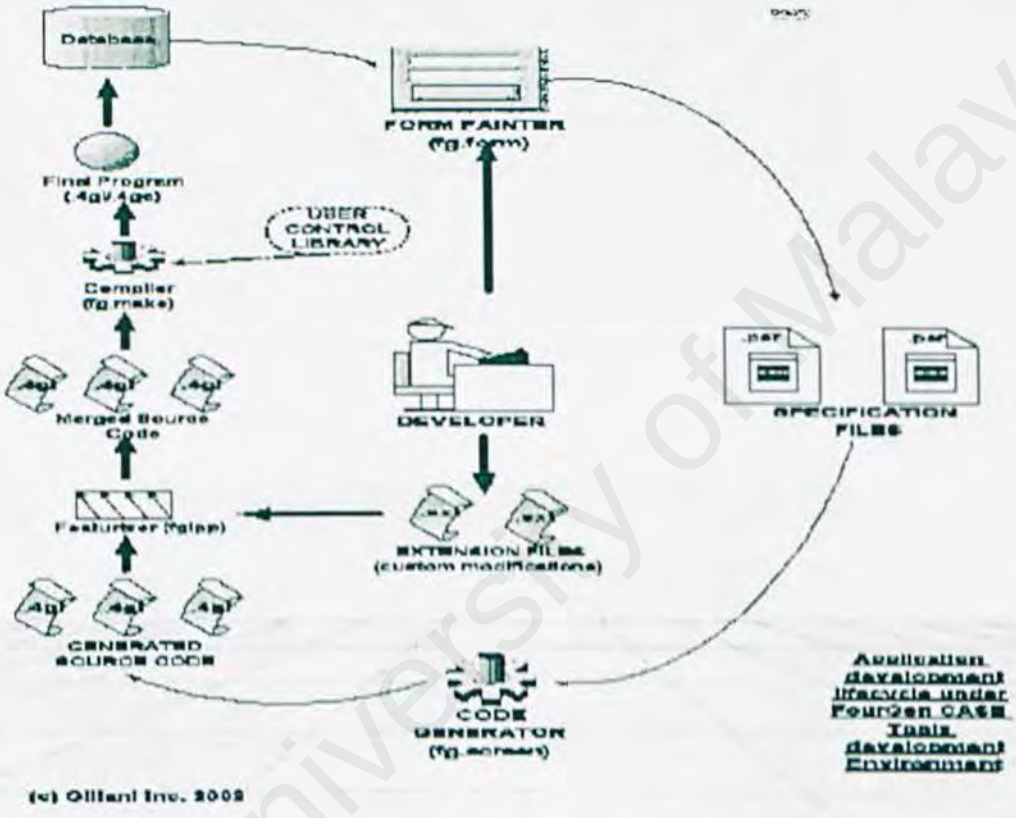


Figure 2.5: The Overall Workbench of the FourGen Case Tool

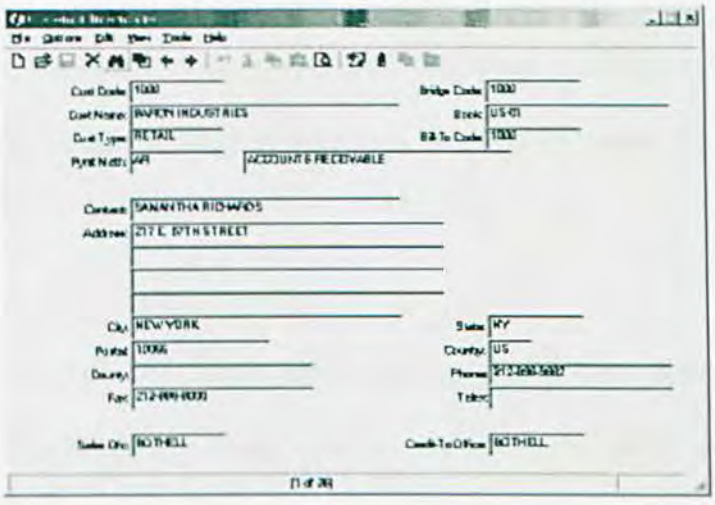


Figure 2.6: The interface of FourGen Case Tool

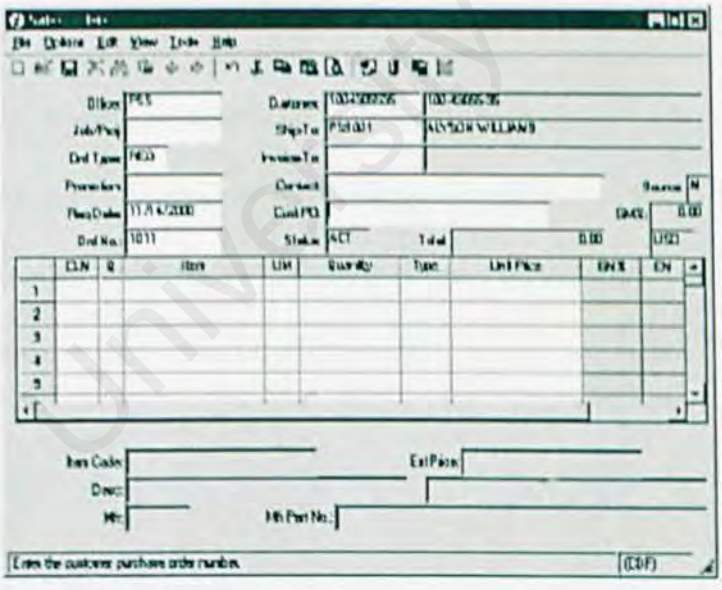


Figure 2.7: The interface of FourGen Case Tool

2.2 Architecture

2.2.1 one-tier architecture

A one-tier application is simply a program that doesn't need to access the network while running. Most simple desktop applications, like word processors or compilers, fall into this category.

One-tier architecture has a huge advantage: simplicity. One- tier applications don't need to handle any network protocols, so their code is simpler. Such code also benefits from being part of independent operations. It doesn't need to guarantee synchronization with faraway data, nor does it need exception-handling routines to deal with network failure, bogus data from a server, or a server running different versions of a protocol or a program.

Moreover, one-tier applications can have major performance advantages. The user's requests don't need to cross network, wait their turn at the server, and then return. This has the added effect of not weighing down your network with extra traffic, and not weighing down your server with extra work.

2.2.2 two-tier architecture

Two tier architecture consist of three components distributed in two layers:

Client (request of services) and server (provider of services).

The three components are

1. User System Interface (such as session, text input, dialog and display management services).

2. Processing management (such as process development, process enactment, process monitoring, and process resource services)

3. Database Management (such as data and file services)

The two tier design allocates the user system interface exclusively to the client. It places database management on the server and splits the processing management between client and server, creating two layers.

In general, the user system interface client invokes services from the database management server. In many two tier design, most of the application portion of processing is in the client environment. The database management server usually provides the portion of the processing related to accessing data (often implemented in store procedures). Clients commonly communicate with server through SQL statements or a call-level interface. It should be noted that connectivity between tiers can be dynamically changed depending upon the user's request for data and services.

The two tier architecture improves flexibility and scalability by allocating the two tier over the computer network. The two tier improves usability because it makes it easier to provides customized user system interface. It is possible for a server to function as a

client to different server-in hierarchical client/server architecture. This is known as a chained two tier architecture design.

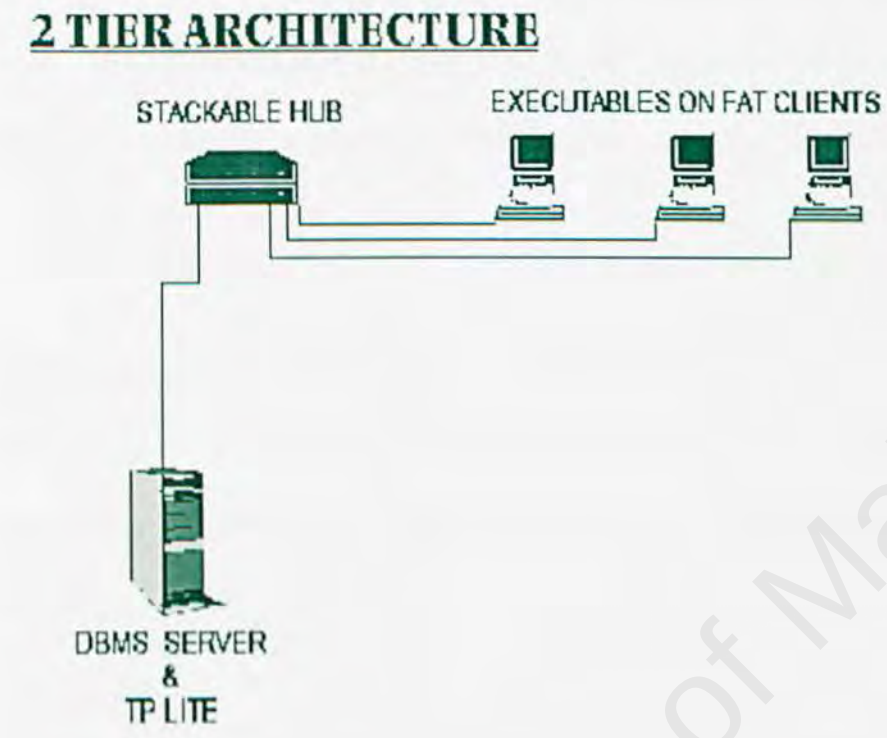


Figure 2.8: two tier architecture

2.2.3 three-tier architecture

2.2.3.1 Client-tier

It is responsible for the presentation of data, receiving user events and controlling the user interface. The actual business logic (e.g. calculating added value tax) tax has been moved to an application server.

2.2.3.2 Application-server-tier

This tier is new, i.e. it isn't present in 2-tier architecture in this explicit form. Business object that implement the business rules " lives' here, and available to the client-tier. This level now forms the central key to solving 2-tier problems. This tier protects the data form direct access by the clients.

The object oriented analysis "OOA", on which many books have been written, aims in this tier: to record and abstract business processes in business-objects. This way it is possible to map out the application-server-tier directly from the CASE tools that support OOA.

Furthermore, the term "component" is also to be found here. The term pre-dominantly describes visual components on the client side. In the non-visual area of the system, components on the server-side can be defined as configurable objects, which can be put together to form new application processes.

2.2.3.3 Data-server-tier

This tier is responsible for the data storage. Besides the widespread relational database systems, existing legacy systems database are often reused here.

It is important to note that boundaries between tiers are logical. It is quite easily possible to run al three tiers on one and the same (physical) machine. The main importance Is that

the system is neatly structured, and that there is a well planned definition of the software boundaries between the different tiers.

2.2.4 N-tier architecture

The notion of separating clients from servers, though, provided programmers a great service. No longer were they tied to the resources of a single machine for the accomplishment of their tasks. Resources and implementations could be moved to the computer that best accomplished the task. In fact, as database applications grew in complexity, it becomes apparent that multiple classes of servers would be needed.

Relational database implemented the ability to perform processing so that database administrators could implement data integrity rules. Triggers and stored procedures began to look like small programs in their own right. At some point, it become obvious that database were implementing more processing than was strictly necessary for data integrity. They were implementing business rules : unit of processing of algorithms that represent some concept of importance to the organization using the database. This might consist of how discounts are calculated, for example.

Because business rules are broadly applicable, it's desirable to implement them once, on a centrally managed server. Since they did not directly related to data integrity, however, it's not clear that they should be implemented on a relational database using data-

orientated tools and languages. The n-tier architecture model resulted from this is shown as below:

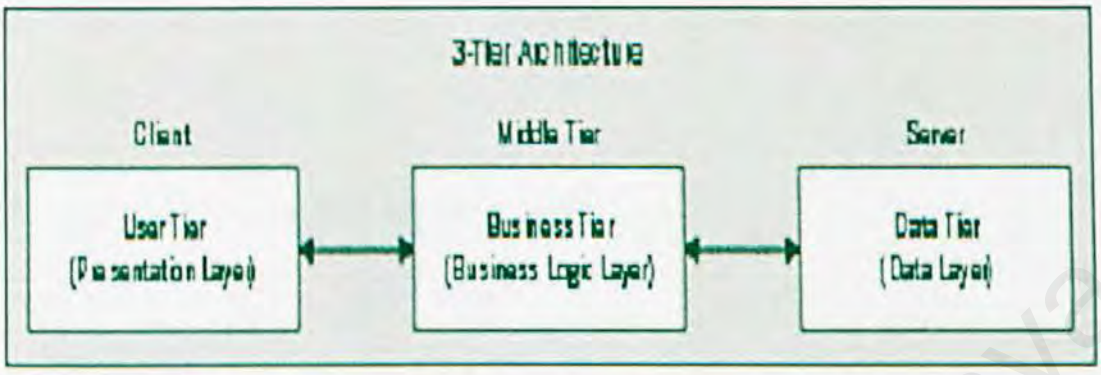


Figure2.8: Three tier architecture

In this model, sometimes also known as the 3-tier model, clients remain focused on presenting information and receiving input from users. This is known as the presentation tier.

Data, meanwhile, is hosted on one or more data servers in the data tier. Only that processing required to access data and to maintain its integrity gets implemented on this tier. This includes SQL query engines and transaction managers for commercial software, as well as triggers and stored procedures written by database administrators. Unlike the client-server model, however, these triggers and procedures are limited In scope to managing the integrity of the data residing on this tier.

Business rules are moved to the **application logic tier**, sometimes referred to as the **business services** or **middle tier**

Pros and Cons of the Architecture

Architecture	Pros	Cons
One tiers	❖ Simple ❖ Very high performance ❖ Self-contained	• No networking – can't access remote services • Potential for spaghetti code
Two tiers	❖ Clean, modular design ❖ Less network traffic ❖ Secure algorithms ❖ Can separate UI from business logic	• Must design/implement protocol • Must design/implement reliable data storage
Three tiers	❖ Can separate UI, logic, and storage ❖ Reliable, replicable data ❖ Concurrent data access via transactions ❖ Efficient data access	• Need to buy database product • Need to hire DBA • Need to learn new language(SQL) • Object-relational

		mapping is difficult
N-tiers	❖ Support multiple applications more easily ❖ Common protocol / API	• Quite inefficient • Must learn API (COBRA , RMI, etc) • Expensive products • More complex; thus, more potential for bugs • Harder to balance loads

Figure 2.9: Architecture Comparison

2.2.5 Conclusion for Software Architecture

The three tier architecture is chosen for this project because it is easier to implement and design. The three tier design has many advantages over traditional two tier or single tier designs, the chief ones being:

- ❖ The added modularity makes it easier to modify or replace one tier without affecting the other tiers.
- ❖ Separating the application functions from the database functions makes it easier to implement load balancing. In this project the three tier consists of web browser as

client tier, web server as application server tier and database as the data server tier. A web server can be defined as a computer program that receives HTTP requests from web browser for document. Web server will achieve and process the data from database server. Web server return both the document and the document type to the client so that the client knows what to do with the document or data once it is received. The most common document type transferred between web server and client is HTML.

2.3 Network

A network is a set of devices connected by media links. A node can be a computer, printer or any other device capable of sending or receiving data generate by other nodes on the network. There is a few types of network can be considered to be used in this project: LAN, WAN, internet, intranet and extranet.

2.3.1 Local Area Network (LAN)

A LAN is a data communication system that allows a number of independent devices to communicate directly with each other in a limited geographic area, which allows users to share files, programs or data with a minimum of effect. A LAN is usually local; this means that the machines are located in one physical location --- like a building or just one floor of a building. A LAN tends to use just one set of networking options. For example, a LAN generally uses one network operating system, one type of cable ad one logical

topology. A LAN is usually set up for a small group of people such as department or a division. A LAN is not limited to any particular computer operating system. DOS, Macintosh and UNIX can all run across a LAN. Actually, they can al run across the same LAN at the same time, if the right software is used.

2.3.2 Metropolitan Area Network (MAN)

By definition, a MAN is a network design to extend over an entire city. When Local Area Network is close proximity need to exchange data, they can connect privately using cable and routers or gateways. When LAN of a single enterprise are distributed over a larger area such as city, privately owned connecting infrastructure is impractical, a better alternative is to use the services of existing utilities such as telephone company.

2.3.3 Wide Area Network (WAN)

While the geographic distinctions of "local" and "wide" area networks imply a difference in the distance between network nodes that is not always the case. By definition, a Wide Area Network (WAN) is a government-regulated public network or privately owned network that crossed into the public network environment. It doesn't matter whether the area being bridged is across the country or across the street. If the geographical separation crosses over a public thoroughfare, a WAN is required to make the connection.

The WAN typically used to connect two or more local area networks (LANs). A LAN is a privately owned communications system that is designed to allow users to access and share resources (computer, printers, and servers) with other users. LANs that are interconnected by a WAN may be located in the same geographical area, such as an industrial park or campus setting, or in geographically separates areas, such as different cities or even regions.

2.3.4 Internet

Internet is a collection of communication networks interconnected across 2 or more LANs or sub-network. It is a global network connecting million of computers. Program running on the computers connected to it interact by passing messages, employing a common means of communication. More than 100 countries are linked into exchange of data, news, and opinions.

Each internet computer called a host is independent. Its operators can choose which Internet services to use and which local services to make available to the global Internet community.

The internet is also a very large distributed system. It enables users, wherever they are to make use of service such as the World Wide Web, email and file transfer. The set of service is open-ended-it can be extended by addition of server computers and new types of services. Internet Service Provider (ISP) is companies that provide modem links and other type of connection to individual user and small organization, enabling them to access service anywhere in the internet.

2.3.5 Intranet

An Intranet is portions of the Internet that is separately administered and has a boundary that can be configure to enforce local security policies. Intranet is a tem used to refer to the implementation of Internet technologies within a corporate

Organization rather than for external connection to the global Internet. It is a network based on TCP/IP protocols belonging to an organization, usually a corporation, accessible only by the organization's members, employee, or other with authorization. An intranet's Web sites look and act just like any other Web sites but the firewall surrounding an intranet fends off unauthorized access. The role of firewall is to protect an intranet by preventing unauthorized messages leaning or entering.

2.3.6 Extranet

An extranet is a private network that uses the Internet Protocol and the public telecommunication system to securely share part of a business's information or operations with suppliers, vendors, partners and other business. An extranet can be viewed as part of a company's intranet that is extended to users outside the company. It has also been described as a "state of mind" in which the Internet is perceived as a way to do business with other companies as well as to sell products to customers.

Whereas an intranet resides behind a firewall and is accessible only to people who are members of the same company or organization, an extranet provides various levels of accessibility to outsiders. User can access an extranet only if user has a valid username and password, and user's identity determines which parts of the extranet user can view.

2.3.7 Conclusion for network

Networks are everywhere. The Internet is one as are the many networks of which it is compose. Corporate network, factory networks, campus network, home network, all of these, both separately or in combination, share the essential characteristics that let users from different states can access the system if they have internet access.

Since this is an online system that may access by users nation wide, internet is the most suitable network to be used in this project. Users form different states can access the system if they have internet access. This means that users can keep in touch and get their documents at anytime and anywhere despite of the limitation of geographical barrier.

2.4 Web Server

A Web Server is a program that serves web pages upon request. Every web server has an IP address and possibly a domain name. For example, if a user enters the URL http://www.pecebopedia.com/index.html in your browser, this sends a request to the server whose domain name is pcwebopedia.com. The server then fetches the page named index.html and sends it to the user's browser. Web servers and browsers communicate using HTTP (Hypertext Transfer Protocol), a simple but effective language for requesting and transmitting data over a network.

Web servers come in various shapes and sizes. They run under a variety of operating system, have varying levels of power and complexity, and range in price form rather expensive to free. Studies on several web servers will be carried out: Apache, Microsoft Internet Information Server (IIS) and Personal Web Server (PWS).

2.4.1 Apache

Apache is a high-end enterprise-level server developed by a loosely knot group of programmers. The original version of Apache was written for UNIX but there are now versions that run under OS/2, Windows and other platforms. Apache has become the world's most popular web server. By some estimates, it is used to host more than 50% of all web sites in the world.

The keys to Apache attractiveness and popularity le instead in the qualities listed above and its extensibility, its free distributed source code and active user support for the server. And version 1.3.0, now in official release, is already being touted as the most stable and fastest version of Apache ever.

Among the most notable features is its cross-platform support, protocol support (HTTP/1.1), modularity (API), security, logging and overall performance and robustness. Apache distributes a core set of modules that handle everything form user authentication and cookies to typo correction in URLs.

2.4.2 Internet Information Server (IIS) v5.1

Internet Information Server is a Microsoft offering of a Web publishing and web server application that allow user s of Window XP to serve web pages on the internet. This version, which comes exclusively as part of the Window 2000 Server operating system, contains many new features along with performance and reliability enhancements.

IIS v5.1 is good as both a first-time web server for those familiar and comfortable with Windows operating system, and a high-end server for hosting providers and large corporate installations. It handles the basics well and is better integrated in Windows than previous versions. IISv5.0 also comes with performance and feature enhancements that will be attractive for mission-critical tasks.

IIS v5.1 uses Secure Socket Layer (SSL) 3.0 and Transport Layer Security (TLS). The ideal computer to run IIS on is at least a 200 MHz Pentium with 128 MB of RAM. Organization should plan on doubling the RAM and CPU speed if they intend to run Advanced Server's clustering, SQL or Transaction services on the same machines as the web server.

2.4.3 Personal Web Server (PWS)

Personal Web Server (PWS) is a GUI base administration tool for managing website. PWS is entry level/ mid range server for Window 9x/NT platforms. It is a scaled-down version of the commercial Information Internet Server (IIS) included with the Server edition of Microsoft Windows NT. PWS is a great entry level web server that makes it easy to publish personal home pages, serve small web sites and share documents via a local intranet.

PWS is one of the best servers available for helping to get users up and running quickly. Wizards are included to guide users through the process of setting up home pages and sharing files, and the PWS administrator reduces the complexity of actually running the web server itself. Users can also use the familiar Explorer interface or PWS's Personal Web Manager to share directories, start and stop the server, and view web site statistics. One of the best uses for PWS is as a platform for testing out web sites on Windows 95/Windows NT Workstation computers before hosting them on the Internet. This allows users to check the validity of links, scripts, and applications as well as to ensure that the overall organization of the site is functioning correctly.

PWS presents the ability to develop transactional web applications using the Microsoft Transaction Server. Overall, while most large enterprises will likely bypass Microsoft's Personal Web Server for the high end Internet Information Server, PWS will remain one of the best available options for individuals wanting to serve their own personal home pages and for small organizations needing to host their own web sites.

2.5 Operating System

2.5.1 UNIX

UNIX is a much older operating system that was created in the late 1960s. UNIX is a registered trademark and using the tem involves meeting a long list of requirements and playing a sizable amount of money to be certified.

UNIX is designed to provide a multi-user, multitasking system for use by programmers. It began as an open source project that become widely used in Universities, scientific labs, and by the U.S government. The philosophy behind the design of UNIX was to provide simple and powerful utilities that could be pieced together in a flexible manner to perform a wide variety of tasks. Over the years, hundreds of talented programmers contributed their own improvements to UNIX making it extremely robust, stable, and fast. However, UNIX is more difficult to learn and isn't as widely supported as Microsoft Window 2000.

2.5.2 Linux

Linux began with his post to the Usenet newsgroup comp.os.minix, in August, 1991, written by a Finnish college student. Linux has gradually become a popular operating system for Internet / intranet serving purposes. With a host of performance enhancements that will benefit web sites and internet sides of all sizes, Linux is a stable and high performance operating system for internet usage. Linux is a UNIX clone, a work-alike.

All the kernel code was written from scratch by Linus Trovalds and kernel hackers.

Many programs that run under Linux were written from scratch

but many, many more are simply ports of software from other operating system,

especially UNIX and UNIX-like operating system.

Linux has made progress, primarily in functionality important to Internet infrastructure

and web server capabilities, including a greater selection of drivers, easier installation,

GUI-based front ends for Web administrator and window management.

2.5.3 Microsoft Windows 2000 server

Windows 2000 Server is a product of the Microsoft and it is a preemptive, multi-tasking

operating system.

Benefits:

- Windows 2000 Server is integrated with the Internet Information Server (IIS 5.0) that supports ASP 3.0 which is more scalable and enables faster web page processing.

- It take less time to build the server and reduce the likelihood of error. Besides, additional new wizards reduce the time it takes to create new Web sites and virtual directory (Microsoft, 2001a).

- The system architecture of the Window 2000 helps deliver higher uptime than other competitive systems.

- Microsoft Window 2000 server supports the latest security standards including 56-bit and 128-bit SSL / TSL, Server Gated cryptography, Digest Authentication, Kerberos v5 authentication and Fortezza (Microsoft, 2001b).

- Microsoft Window 2000 Server can encrypt file where increase security of data on the hard disc.

- IIS application protection keeps web application running separately form the web server itself, preventing an applications form crashing the web server.

- Window 2000 Server is also using NTFS file system and shares the same advantage with Window NT.

2.5.4 Microsoft Window 2000

The Windows 2000 family of operating systems give users increased flexibility, and are the multipurpose network operating systems for businesses of all sizes. This section contains the core documentation, code samples, and other resources for developing on the Windows XP platform. By developing within the Windows environment, it can provide our applications with a graphical user interface, display graphics and formatted text, and manage system objects such as memory, files, and processes.

Benefit:

- Provide fundamental improvements—such as modifications to the operating system core to prevent crashes and the ability for the operating system to repair itself.

- Easier to deploy, manage, and support. Centralized management utilities, troubleshooting tools, and support for self-healing applications all make it simpler for administrators and users to deploy and manage desktop and laptop computers.

- Performance is about 32 percent faster than the previous type window so it is more productive.

- Provides comprehensive security features to help protect sensitive data, both locally on desktop computer and as it is transmitted over local area network, phone lines, or the Internet.

2.5.5 Microsoft Window XP

Windows XP is built on an enhanced Windows 2000 code base, with different versions aimed at home users and business users: Windows XP Home Edition and Windows XP Professional. Windows XP integrates the strengths of Windows 2000—standards-based security, manageability and reliability—with the best features of Windows 98 and Windows Me—Plug and Play, easy-to-use user interface, and innovative support services to create the best Windows yet.

Benefit:

- Delivers a new level of stability, so we can focus on our work. For example, in most cases, if one program crashes, our computer will keep running.
- Manages system resources efficiently, meeting the performance standards set by Windows 2000 and exceeding those set by Windows 98 Second Edition.
- Encrypting File System provides a high level of protection from hackers and data theft by transparently encrypting files with a randomly generated key.
- If something goes wrong with our computer, we can revert the system to a previous state

2.5.6 Solaris

Solaris is one of the Sun products. It runs under Unix operating system. Sun has offered a 32-bit version of Solaris for Intel since 1993.

Benefits (Solaris, 2001):

- Designed for multiprocessing and 64-bit computing, Solaris software delivers a consistent environment – from smaller departmental servers to massive, clustered servers with more than 100 CPUs. The 64-bit computing enabling applications to process data in 64 block instead of 32 and it has improved performance.

- The multithreaded design of the Solaris environment also delivers much faster performance for key enterprise applications and core system functions.

- With Solaris 8 software, security is easy to deploy an mange--- many frameworks and products are either incorporated or available via free download. These include Kerberos.

Through 56-bit 128-bit encryption routines, users can deploy file encryption and protected login methods regardless of location

2.6 Database Server

A database is a structured collection of data. To add, access and process data stored in a computer database, a database server is needed. There are several database servers available currently: Oracle, SQL200, DB2 and MySQL. Business today demands a different kind of database solution. Performance, scalability and reliability are essential, and time to market is critical.

2.6.1 Oracle

Oracle has always designed and marketed a single database product that runs on a wide range of commercially available hardware platforms. So, regardless of hardware, at the feature and tools level, and to some extent at performance level, Oracle's approach brings a high degree of operational consistency.

Oracle includes a fully integrated set of easy to use management tools, full distribution, replication and web features. Oracle also provides the highest levels of availability through fast fail over, easier management, and zero data loss disaster protection, with Data Guard, the only complete data protection solution available on the market.
Oracle can runs on UNIX, Linux and Windows platform. However, it is expensive and separate licenses are required for each of its database engine.

2.6.2 PostgreSQL

PostgreSQL is a sophisticated Object-Relational DBMS, supporting almost all SQL sconstructs, including subselect, tracsactions and user defined types and functions. It is the most advanced open-source database available anywhere.
PostgreSQL I an enhancement of the POSTGRES database management system, a next generation DBMS research prototype. While PostgreSQL retains the powerful data model and rich data types of POSTGRES, it replaces the PostQuel query language with an extended subset of SQL. PostgreSQL is free and the complete source is available.

PostgreSQL runs on Solaris, SunOS, HPUX, AIX, Linux, Irix, FreeBSD and most flavors of UNIX.

2.6.3 MySQL

MySQL is a relational database management system. MySQL stores data in separate tables rather than putting all the data in one big storeroom. This adds speed and flexibility. The tables are linked by defined relations making it possible to combine data form several tables on request.

MySQL is a small, compact, easy to use database server, ideal for small and medium sized applications. It is client / server implementation that consists of a server and many different client programs. It is available on a variety of UNIX platforms, Linux, Windows NT, Windows 95/98 and Windows 2000.

MySQL is Open Source Software. Open Source means that it is possible for anyone to use and modify. Anybody can download MySQL from the internet and use it without paying anything. Anybody can study the source code and change it to fit their needs.

2.6.4 Microsoft Access 2002

Microsoft Access 2002 is the newest version of family Microsoft Access. It provides a number of new features that makes designing and using a database easy and produce more powerful databases.

Benefits;

- Microsoft Access 2002 introduces Pivot Chart views to tables, queries, views, stored procedures, functions and forms. Therefore, it can perform data analysis quickly.
- Microsoft Access 2002 provides powerful, intuitive ways of sharing XML data regardless of differences in the platform, data format, protocol, schemas or business rules.
- Access also provides methods for easily controlling data by making it simple to create and apply schemas and style sheets.
- Administration have the ability to undo and redo multiple actions in Design view in all object in Microsoft Access databases and in views, stored procedures and functions in Microsoft Access Project.

2.6.5 Microsoft SQL Server 7.0

Microsoft SQL Server 7.0 is a single, multithreaded relational database server primarily intent for transactional processing. Microsoft SQL Server is based on the client / server architecture. The server can communicate with any ODBC compliant software program that resides on a computer connected to the network. Request to the server are made in the Structured Query Language (SQL), a non-procedure language that has become the standard for use with relational database.

Benefit:

- Microsoft SQL Server can store a large amount of information and allow access for many different simultaneous users. It is a powerful and comprehensive database. (Wynkoop,1999)

- Microsoft SQL Server maintains referential integrity and security and ensures that operation can be recovered in the event of numerous types of failure. SQL server can control the access for the type of information that can be retrieved by the user.
- The SQL server ensures that information at all level of an organization can flow smoothly and inexpensively. The data transformation services make it easy to import, export and transforms hererogeous data using OLE Database, Open Database Connectivity (ODBC) or text-only files. This means that it provides automatic distributed update capability across two or more SQL server.
- Microsoft SQL Server can improve query processing for complex queries. The query processor has been redesigned to support, data warehouse and OLAP application. The query processor includes several new execution strategies that can improve the performance of complex queries.
- Backup and restore operation in Microsoft SQL server run much faster, have less performance effect on server operation.

2.6.6 Microsoft SQL Server 2000

Microsoft® SQL Server™ 2000 extends the performance, reliability, quality, and ease-of-use of Microsoft SQL Server version 7.0. Microsoft SQL Server 2000 includes several new features that make it an excellent database platform for large-scale online transactional processing (OLTP), data warehousing, and e-commerce applications.

The OLAP Services feature available in SQL Server version 7.0 is now called SQL Server 2000 Analysis Services. The term OLAP Services has been replaced with the term Analysis Services. Analysis Services also includes a new data mining component.

Repository component available in SQL Server version 7.0 is now called Microsoft SQL Server 2000 Meta Data Services. References to the component now use the term Meta Data Services. The term repository is used only in reference to the repository engine within Meta Data Services

Benefit:

- Provide performance tuning to minimize the response time for each query and to maximize the throughput of the entire database server by reducing network traffic, disk I/O, and CPU time. This goal is achieved through understanding application requirements, the logical and physical structure of the data, and tradeoffs between conflicting uses of the database, such as online transaction processing (OLTP) versus decision support.

- Microsoft® SQL Server™ 2000 introduces new features that support XML functionality. The combination of these features makes SQL Server 2000 an XML-enabled database server. These new features include:

    - The ability to access SQL Server using HTTP.
    - Support for XDR (XML-Data Reduced) schemas and the ability to specify XPath queries against these schemas.
    - The ability to retrieve and write XML data:
    - Retrieve XML data using the SELECT statement and the FOR XML clause.
    - Write XML data using OPENXML rowset provider.
    - Retrieve XML data using the XPath query language.
    - Enhancements to the Microsoft SQL Server 2000 OLE DB provider (SQLOLEDB) that allow XML documents to be set as command text and to return result sets as a stream.

- SQL server 2000 helps in improve the developer productivity. User-defined functions, cascading referential integrity and the integrated Transact-SQL debugger allow you to reuse code to simplify the development process.

- SQL Server 2000, in conjunction with other Microsoft Windows Server System™ integrated server software, provides even more power for your e-business.

Improve overall system performance with built-in support for a virtual system area network (VI SAN)

2.7 Language

2.7.1 Java Server Page (JSP)

JSP is API developed by Sun to deploy web-based application, which can be embedded with Java and Servlet into the HTML document. JSP supports only platforms that have a Java virtual machine available (OrZech and Staff, 2001).

Benefit:

- JSP is a cross-platform scripting supported by others operating system such as Unix and web server such as apache web server.

- JSP supports database connectivity using Java Database Connectivity (JDBC).
- Since Java is an object-oriented-programming language which allows inheritance and improve reusability. Methods in parent class can be inherited to the child and this reduces additional coding time.
- Java programming language supports error handling using keyword such as try and catch keyword to reduce time for debugging.
- Since it uses Java, it can processes complex logic.
- Whenever the JSP page is accessed, the Servlet is there as Java byte code in the Web server's memory, ready to query a database and serve up the HTML immediately. It reduces the processing time when the same JSP page is surfed next time (Monkey, 2001).

2.7.2 ColdFusion

Allaire's Cold Fusion is a development and web server environment specifically designed for the web application. Cold Fusion uses Cold Fusion Markup Language (CFML) tags to generate active web content. In order to run ColdFusion page, ColdFusion server is needed.

Benefit:

- ColdFusion integrates best with HTML because the CFML looks very similar to HTML tags and is simple to write.
- ColdFusion is a cross-platform scripting language which support several web servers including IIS and Apache and could run concurrently with most Windows and Solaris Web Server.
- ColdFusion can be connected to the database using simple CFML tags (CFQUERY).
- ColdFusion supports try/catch keywords for error handling.
- ColdFusion studio gives instant access to every command, method, property and functions by simply a click on the mouse. It minimizes the amount of time looking for information (Monkey,2001)
- ColdFusion supports the use of custom tags and reusability. Any ColdFusion page created can be called as a custom tag. A new page can use previously created pages using tag.
- Having error handling feature using cftry and cfcarch tags.

2.7.3 Personal Homepages (PHP)

PHP is an established server side scripting language for creating dynamic web pages. This language is expressly designed for web applications. The language style and syntax used in PHP is similar to perl, C and C++.

Benefit:

- PHP is a cross platform language where it supports all major platforms and can integrate well with different Web servers: iPlanet / Netscape Enterprise Server, IIS and Apache.
- It supports most popular databases including Informix, Oracle, etc.
- PHP having the features for error handling.
- Can connect to any database using ODBC for windows based operating system and Sysbase for Unix based operating system.
- Support inheritance and can access functions and variables in its parent class.

2.7.4 ASP.NET

ASP.NET is a new and powerful technology for creating dynamic web pages. It's a convergence of two major Microsoft technologies, Active Server Page (ASP) and .NET. ASP is a relative old timer on the web computing circuit and has provided a sturdy, powerful and effective way of creating dynamic web pages.

Benefit:

- Easy Programming Model. ASP.NET makes building real world Web applications dramatically easier. ASP.NET server controls enable an HTML-like style of declarative programming that let you build great pages with far less code than with classic ASP.

- ASP.NET pages work in all browsers -- including Netscape, Opera, AOL, and Internet Explorer.

- Flexible Language Options. ASP.NET lets us leverage our current programming language skills. Unlike classic ASP, which supports only interpreted VBScript and JScript, ASP.NET now supports more than 25 .NET languages (including built-in support for VB.NET, C#, and JScript.NET -- no tool required).

- Rich Class Framework. Application features that used to be hard to implement, or required a 3rd-party component, can now be added in just a few lines of code using the .NET Framework. The .NET Framework offers over 4500 classes that encapsulate rich functionality like XML, data access, file upload, regular expressions, image generation, performance monitoring and logging, transactions, message queuing, SMTP mail, and much more.

2.8 Data Access Technology

DSP will require data access technology to enable communication and access to its various databases. A few of the Microsoft Data access strategy and technology is reviewed and considered.

2.8.1 Universal Data Access (UDA)

UDA is a high level specification developed by Microsoft for accessing data objects regardless of their structure. The strategy of Universal Data Access is to assure open, integrated, standards-based access to all types of data that is from SQL to non-SQL to even unstructured data across a wide variety of applications, from traditional client/server to the web. The main components of UDA are ADO, OLEDB and ODBC.

2.8.2 ADO (Active Data Object)

Active Data Object (ADO) is the Microsoft's newest high level interface for data objects that most applications developers will use. ActiveX Data Object (ADO) enables you to write a client application to access and manipulate data in a database server through a provider. ADO's primarily benefits are ease of use, high speed, low memory overhead and a small disk footprint.

ADO is designed to eventually replace Data Access Objects (DAO) and Remote Data Objects (RDO). Unlike RDO and DAO, which are designed only for accessing relational databases, ADO is more general and can be used to access all sorts of different types of data, including web pages, spreadsheets and other types of documents.

ADO provides consistent access to data for creating a front-end database client or middle tier business object using an application, tool, language or even an Internet browser. ADO is the single data interface for developers creating 1 to n-tier client/server and web based data driven application.

2.8.3 ADO .NET

ADO.NET is Microsoft latest data access technology and as an integral part of the .NET Framework, is far more than simply an upgrade of previous incarnations of ActiveX Data Objects ADO. ADO.NET provides an extensive set of .NET classes that facilitate efficient access to data from a large variety of sources, enables sophisticated manipulation and sorting of data, and forms an important framework within which to implement inter-application communication and XML Web Services.

ADO.NET is essentially a collection of classes that expose methods and attributes used to manage communications between an application and a data store. An integral part of the .NET Framework, ADO.NET simplifies integrations of data sharing in distributed ASP.NET applications.

ADO.NET is an expansion of ADO with some of the key concepts retained. ADO.NET has greatly extended to provide access to structured data from diverse sources, which are all accommodated in a consistent, standardized programming model. ADO.NET can be used in any consumer application that needs to connect to and communicate with data

sources such as Microsoft SQL Server as well as data sources exposed via OLEDB and XML.

2.8.4 OLEDB

OLEDB, a set of interfaces for data access, is Microsoft component database architecture that provides universal data integration over an enterprise's network --- from mainframe to desktop --- regardless of the data type. Microsoft's Open Database Connectivity (ODBC) industry standard data access interface continues to provide a unified way to access relational data as part of the OLEDB specification. Over time, OLEDB is expected to lead new database products that are assembled form best-in –class components rather than from the monolithic products available today.

OLEDB provides a flexible and efficient database architecture that offers applications, compilers, and other database components efficient access to Microsoft and third-party data stores.

OLEDB is the fundamental Component Object Model (COM) building block for storing and retrieving records and unifies Microsoft's strategy for database connectivity. It will be used throughout Microsoft's line of applications and data stores.

OLEDB defines interfaces for accessing and manipulating all types of data. These interfaces will be used not just by data-consuming applications but also by database providers. By splitting databases apart, the resulting components can be used in a

efficient manner. For example, component called service providers can be invoked to expose more sophisticated data manipulation and navigation interfaces on behalf of simple data providers.

2.8.5 Open Database Connectivity (ODBC)

ODBC is a standard database access method developed by Microsoft Corporation. The goal of ODBC is to make it possible to access any data from any application, regardless of which database management system is handling the data. ODBC manages this by inserting a middle layer, called a database driver, between an application an the DBMS. The purpose of this layer is to translate the application's data queries into commands that the DBMS understand. For this to work, both the application and the DBMS must be ODBC compliant---that is, the application must be capable of issuing ODBC commands and the DBMS must be capable of responding to them. Since version 2.0, the standard supports SAG SQL.

2.8.6 JDBC

JDBC technology is an API that lets you access virtually any tabular data source from the Java programming language. It provides cross-DBMS connectivity to a wide range of SQL databases, and now, with the new JDBC API, it also provides access to other tabular data sources, such as spreadsheets or flat files.

The JDBC API allows developers to take advantage of the Java platform's "write once, run anywhere" capabilities for industrial strength, cross-platform applications that require access to enterprise data. With a JDBC technology-enable driver, a developer can easily connect all corporate data even in a heterogeneous environment.

2.9 Authoring Tools

2.9.1 Microsoft Visual InterDev

Microsoft Visual InterDev is a web development tool designed for programmers to create an interactive web page with data is as simple a dragging and dropping, setting some properties and saving the page. No coding is required in using Visual InterDev. It includes site design tools that help user easily plan pages, organize their links, and apply a consistent theme to the web site. Visual InterDev includes three ways to view your HTML and ASP pages.

These three views are the cornerstone of Visual InterDev. They replace the simple source code editor include with Visual InterDev 1.0 and supports design-time controls (DTCs), debugging, statement completion and object browsing.

The new data environment provides easy commands for making web application data-driven. Instead of burying complex SQL statements deep within an .asp file, the statements are now exposed, maintained and reused at the application level through the

data environment under the Global asp file. Instead of modifying the query within each page, developers can modify the data command and changes are incorporated into files that reference that data command. Developers also can drag fields from the command directly onto HTML or ASP page.

2.9.2 Notepad

Notepad is the world's most versatile HTML editing tool absolutely free when purchase this software: Window 2000 and above.

Notepad has one of the simplest user interfaces of any Internet Web authoring tools. The menus are logically laid out, conforming to all standard in design, so users can understand them before use Notepad.

Notepad has the same interface for all versions of Windows, so moving over the latest version of Windows should not hamper HTML code creation. The Notepad web authoring tool is compatible with every single standard of Internet presentation medium yet devised. Notepad was designed to have a very small application footprint, taking up as little space as possible in computer's memory and a minimum of disk space.

Notepad gives clear, easy to read and full HTML. There is no code hidden, and users have control over all part of the HTML code. JavaScript is also fully supported by Notepad.

2.9.3 Macromedia Dreamweaver

Macromedia Dreamweaver is professional visual editor for creating and managing web sites and pages. It gives developers the productivity of a visual web page layout tool, the control of HTML text, editor and support for new web technologies, all in one software packing.

Developers can use it to create web sites visually, with confidences that HTML being generated is concise and always editable. It includes advanced features that take advantage of the latest innovations on the web, such as dynamic HTML and CSS, while still ensuring that web pages work well in a variety of web browser. All of the code generated by it is carefully created to work on as many platforms and browsers as possible.

2.9.4 Adobe Photoshop

Adobe Photoshop is the most popular image-editing available for Macintosh an Windows-based-computer. It is used as drawing, painting and designing purpose. Users can retouch an image, apply special effects, swap detail between photos, introduce text and logos, adjust color balance and even add color to a grayscale scan.

All these functions are included under a ser of user-friendly editing tools in Adobe Photoshop. It contains graphical icons to represent. Besides that, it also provides many shortcut keys that is easier and save time for users and for those who do not like to use mouse.

Chapter 3: System Requirement Analysis

A process model is abstract representation of a development process. In software development process is, therefore, the sequence of activities that will produce such software. The basic phases such as requirement analysis design, coding and testing, which are usually further broken down into distinct activities. A software development process model specifies how these activities are organized in the entire software development effort.

System analysis is a process of defining a problem, gathering pertinent information, developing alternative solutions and choosing among these solutions to develop the system. In other words, system analysis is actually a finding of what a system des and what its needs are and all these include system requirement (user, needs, recourse) as input and a finish product as output. See figure 3.1.

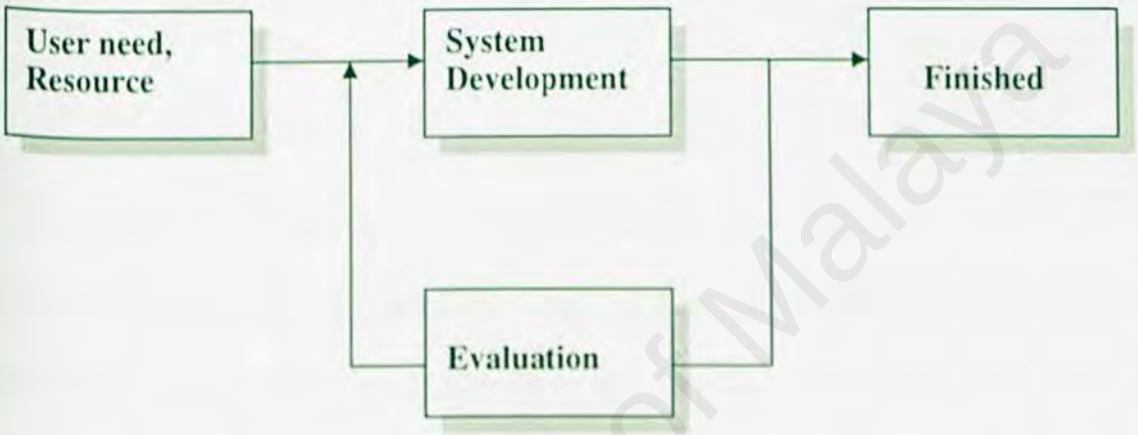


Figure 3.1: System Development Process Model

3.1 Software Development Process

Software development process is defined as any description of software development that contains certain activities in an organized way to produce tested code. The activities involve are:

i. Requirements analysis and definition

ii. System design

iii. Program design

iv. Writing the programs (program implementation)

v. Units testing

vi. Integration testing

vii. System delivery

viii. Maintenance

Process model is used to prescript how a software development should progress or done in actually. It contains a series of steps involving activities, constraints and resources that produce an intended output. Many models have been proposed to help the development team to find inconsistencies, redundancies and omissions in the process and in its constituent parts in order to build a high quality system. These models include waterfall model, v model, prototyping model, operational specification, transformation model, phased development: increments and interactions, and spiral model

Among those process models the V-model is chosen for DSP because:

- Testing brought earlier into the life cycle
- Detailed test plans at each stage
- Versatility and flexibility

- Minimization of errors in development
- Guarantee that flexible requirements are fully implemented

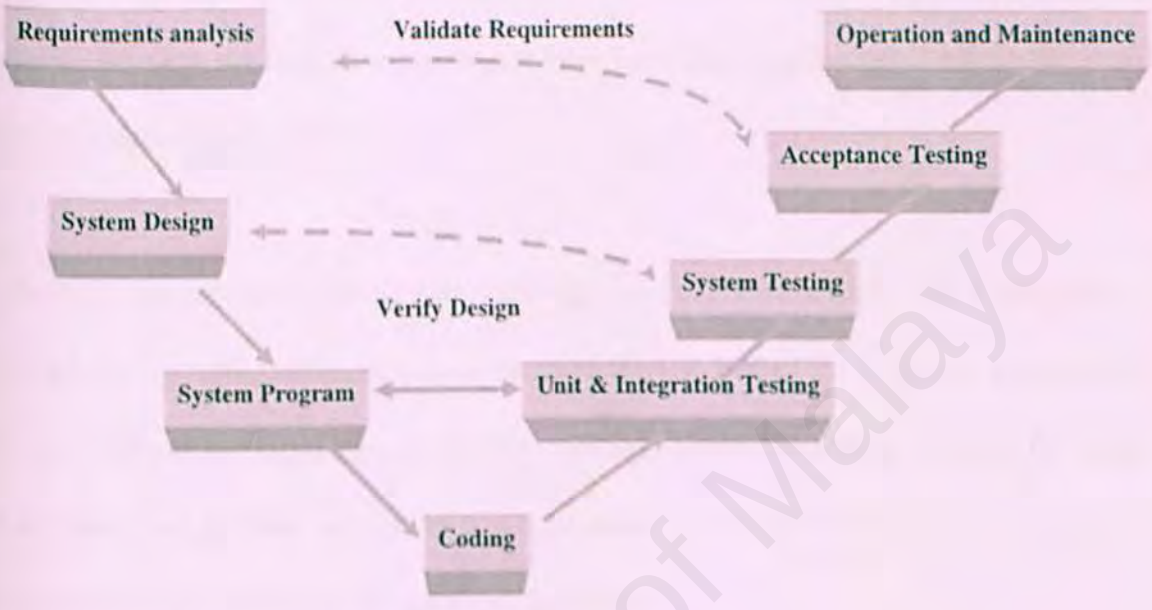


Figure 3.2: The V-model

As shown in Figure 3.2, coding forms the point of the V, with analysis and design on the left, testing and maintenance on the right. Unit and integration testing addresses the correctness of programs. The V model suggest that unit and integration testing also be used to verify the program design. That is, during unit and integration testing, the coders and test team members should ensure that all aspects of the program design have been

implemented correctly in the code. Similarly, system testing should verify the system design, making sure that all system design aspects are correctly implemented. Acceptance testing, which is conducted by the customer rather than the developer, validates the requirement by associating a testing step with each element of the specification; this type of testing checks to see that all requirements have been fully implemented before the system is accepted and paid for.

The model's linkage of the left side with the right side of the V implies that if problems are found during verification and validation, then the left side of the V can be re-executed to fix and improve the requirements, design, and code before the testing steps on the right side are reenacted. In other words, the V model make more explicit some of the iteration and rework that are hidden in the waterfall depiction.

3.2 Technique Used to Define Requirement

This phase involves the capturing of system requirement. Methods used in the elicitation of the requirement are listed below:

Internet Surfing - I have surf around the net for sometime to gain deeper understanding about DSP and web technology available. For the technology aspect, ASP.NET was chosen for its scalability and portability.

Brainstorming - Brainstorming is used in the deciding what feature to propose to the system and also the overall performance of the system.

Discussion - Discussion with supervisor is very important to gather information and ideas. Advise and guidance from the supervisor, Mr Ang Tan Fong is very important to develop a systematic information that achieves the project object objective. This also brings much more understanding of the project.

Document Review - The various documents that carry data and information about the dynamic screen painter for web application were gathered and organized. The information can be found from the Main Library of University Malaya and Document Room in Faculty Computer Science and Information Technology Information University Malaya. Besides, some information also can get from the Microsoft Training Centre.

Chapter 4: Functional Requirement

Functional requirement describes an interaction between the system and its environment. Functional requirement specified the function that the system needs to provide in order to fulfill the user's requirement. Thus, these functions are features that user can use. Functional requirement are statement of services the software ---- dynamic screen painter provide, how the system should react to particular inputs and how the system should behave in particular situation. In some cases, the functional requirements may also explicitly state what the system should not do.

4.1.1 Database Selection

User will be prompted to select which database to access to retrieve the form that need to modify or regenerate. In a system, there will be more than one database exist and so users have to stated which database to access to search for the related information that need in generating a form.

4.1.2 Form Selection

After select the database, users will be asked to choose which form to regenerate for modification purpose. Not all the form in the system can be generated to modify but only certain form that will be specified.

4.1.3 Field Selection

Just after selecting the form, users will be given a list of field of the form that available to select the field that will be display on the form. At here the users have the right to change the field outlook of the form.

4.1.4 Form Generator

This module is use to generate the form after the users finish all the selection and submit it to the system. Form that generated will become live immediately and can be used by the user.

4.1.5 Access Right Control

Access right control module as its named, used by the system administrator to control the access or view level of the user. One of the major job of this module is let only certain user to view certain for can related to the project that they join. The don't have the right to view all the form unless the system administrator approved.

4.2 Non Functional Requirement

Non-functional requirement describe system properties and constraints under which a system must operate. The constraint on the functions provided by the system is summarized as below:

4.2.1 Correctness

Correctness is the extent to which the system satisfies the specifications and fulfills customers' requirement and provides the correct and up-to-date information

4.2.2 Speed / Response Time

The system should be able to process any transaction at the highest speed and avoid unnecessary interception. The response time to retrieve certain information from the database such as name, address, contact number, user verification, customer's profile and etc should be within a reasonable interval time.

4.2.3 Reliability

A system is reliable if it is able to perform all its services and functions accurately and in a timely manner. An acceptance failure rate or recovery time should be set out if the system breakdown. Operation should be well-directed to perform manually during system downtime. Security measures should be well-designed to perform manually during system downtime. Security measures should be well-designed and implemented so that crucial information will not be tempered. The system should not produce costly failures if any errors occur.

4.2.4 Availability

A availability is the probability that the system is operating successfully according to specification at a given point in time.

4.2.5 Maintainability

Maintainability is the probability that, for given conditions of use, a maintenance activity can be carried out within a stated time interval and using stated procedures and resources.

4.2.6 Robustness

Robustness refers to the quality of a system to be able to handle unexpected error and echo back with proper responses.

4.2.7 User Friendliness

The design of the system should be easily understood to accommodate a variety of user levels, as not all users have established technical background. Generally, the design of all the interfaces should conform to the following criterions:

- Clearly labeled and consistent in terms of screen design, error messages display, commands and buttons.
- High degree of understandability, avoiding memorization of events and commands.

4.2.8 Flexibility / Expandability

The system has a high degree of flexibility which allows its module, functionality and volume of services to expand for meeting future requirements.

4.2.9 Security Features

Each user group (Administrator, customer, non-member / public – member) would have access to specific functions in the system, so the system should ensure that only authorized users have access. Also, access to the database and administrator's page has to be controlled with proper authorization and authentication control.

4.3 Hardware Requirement

Hardware requirement for DSP should not be taken as a trivial matter as it affects the development of the system tremendously. On this section, topics of discussion will focus mainly on the hardware specification of both the development hardware environment and system hardware environment.

4.3.1 Development Hardware

DSP is proposed to be developed under the best hardware environment to ensure that the development process can be smoothly carried out. It is also to avoid unnecessary slowdown and external errors form hindering the project. Below are the proposed development hardware requirements:

Server

Intel Pentium 4 Processor 1.8 GHz
512KB L2 Cache
256MB 266MHz DDR SDRAM
20 GB Hard Disk Drive
3.5"FD/ 48X Max CD-ROM
17" Color Monitor

Client

Intel Pentium 4 Processor 1.5 GHz
512KB L2 Cache
256MB 266MHz DDR SDRAM
10GB Hard Disk Drive
3.5"FD/ 48X Max CD-ROM

4.3.2 System Hardware

Because DSP is a web-application, it does not require clients to have high-spec machine. However, the machine that acts as the server (house both the database and application/web server) will need very high performance hardware to handle many requests and processes simultaneously at high speed without encountering bottlenecks or system crashes. Below is the proposed systems hardware:

Server

Intel Pentium 4 Processor 1.5 GHz
512KB L2 Cache
256MB 266MHz DDR SDRAM
20 GB Hard Disk Drive
3.5"FD/ 48X Max CD-ROM

Clients

Intel Pentium 3 Processor 1.0 GHz
512KB L2 Cache
256MB 266MHz DDR SDRAM
10 GB Hard Disk Drive
3.5"FD/ 48X Max CD-ROM

4.3.3 Chosen Platforms, Web Server, Database and Tools

Chosen Development Platform

For the DSP, Window is chosen as the development platform. Microsoft's Window XP is built to work with a series of microprocessors from the Intel Corporation that share the same or similar sets of instructions.

The main reason for choosing Microsoft Window XP as the development system because most of the computers in FSKTM are currently installed with Window XP. Therefore, the implementation of the new system can be done easily and effectively.

4.3.3.1 Benefit of using Microsoft Window XP Professional

Reliable: Window XP Professional is built upon the rock-solid reliability of Window 2000 technology, which makes s it significantly more reliable than Window NT, Window ME or Window 95/98. This makes it even more stable than the previous version of Window.

Manageable and easy to use: the support for standards-based security in Window XP Professional protects corporate data in stand alone and networked environments. In addition, Window XP Professional offers an intelligent user interface that adapts to the way users wok thereby making the users more efficient.

Internet-enable user business: Window XP Professional is designed to make it easier for organizations to embrace the Internet. The built in Internet Explorer (IE), a tightly integrated browser, provides users with a faster and richer Internet experience. With

support for Dynamic HTML (DHTML) and Extensible Markup Language (XML), is offers a powerful platform for developers to create highly scalable end to end e-commerce ad line-of business web application.

4.3.3.2 Chosen Database Management System

As we make comparison between Oracle and SQL 2000, a face that Oracle can support much more complex database compared to SQL Server 2000. Nevertheless, as SQL Server also incorporates a world-class feature set for distributed client-server computing, therefore it is still chosen as database management system.

Benefit:

- Fully web enabled
- Easy access to data through the Web
- Powerful, flexible web-based analysis
- Quick development, debugging and data transformation
- Simplified management and tuning
- Ease of use

4.3.3.3 Chosen Development Data Access Technology

ADO.NET is Microsoft latest data access technology and as an integral part of the .NET Framework, is far more than simply an upgrade of previous incarnation of ActiveX Data Objects ADO. ADO.NET provides an extensive set of .NET classes that facilitate

efficient access to data from a large variety of sources, enables sophisticated manipulation and sorting of data, and forms an important framework within which to implement tier-application communication and XML Web Services.

4.3.3.4 Chosen Development Web Server

IIS is chosen as the web-publishing server its tight integration with Window XP. IIS is a web server, a collection of software programs designed to service requests for information and other resources from client on the internet, World Wide Web or organizational Intranets. In a broader sense, IIS provides a comprehensive web server and web publishing system designed especially for Microsoft Window server operating system. Apart from that, is also allows security features to be implemented on specific virtual directories to control access.

4.3.3.5 Chosen Web Development Tool

ASP.NET has been selected as the web development too for the proposed system. The reasons of choosing ASP.NET are as follows:

Enhanced Performance: ASP.NET is compiled common language runtime code running on the server. Unlike its interpreted predecessors, ASP.NET can take advantage of early binding, just-in-time compilation, native optimization and caching services right

out of the box. This amounts to dramatically better performance before you ever write a line of code.

World-Class Tool Support: the ASP.NET framework is complemented by a rich toolbox and designer in the Visual Studio integrated development environment. WYSIWYG editing, drag-and –drop server controls, and automatic deployment are just a few of the features this powerful tool provides.

Power and Flexibility: because ASP.NET is based on the common language runtime, the power and flexibility of that entire platform is available to Web application developers. The .NET Framework class library, Messaging and Data Access solutions are all seamlessly accessible from the Web. ASP.NET is also language independent, so you can choose the language that best applies to your application or partition your application across many languages.

Simplicity: ASP.NET makes it easy to perform common tasks, from simple form submission and client authentication to deployment and site configuration. In addition, the common language runtime simplifies development, with managed code services such as automatic reference counting and garbage collection.

Manageability: ASP.NET employs a text-based, hierarchical configuration system, which simplifies applying settings to your server environment and Web application. Because configuration information in stored as plain text, new setting may be applied without the aid of local administration tools. This "Zero local administration" philosophy extends to deploying ASP.NET Framework applications as well. An ASP.NET Framework application is deployed to a server by copying the necessary files to the server. No server restart is required, even to deploy or replace running compiled code.

Customizability and Extensibility: ASP.NET delivers a well-factored architecture that allows developers to 'plug-in' their code at the appropriate level. In fact, it is possible to extend or replace any subcomponent of the ASP.NET runtime with your own custom-written component. Implementing custom authentication or state services has never been easier.

Chapter 5: System Design

5.1 Introduction

System design is a phase of the waterfall that the entire requirements for the system are translated into system characteristics. The requirements for system are regarding to the analysis that had been discussed in the previous chapter. This will comprise of system architecture, database design, process design and interface design.

5.2 System Architecture

The DSP overall application infrastructure will be based on three-tier architecture. The three-tier are:

- Presentation / application tier
- The functionality / service tier
- The data repository

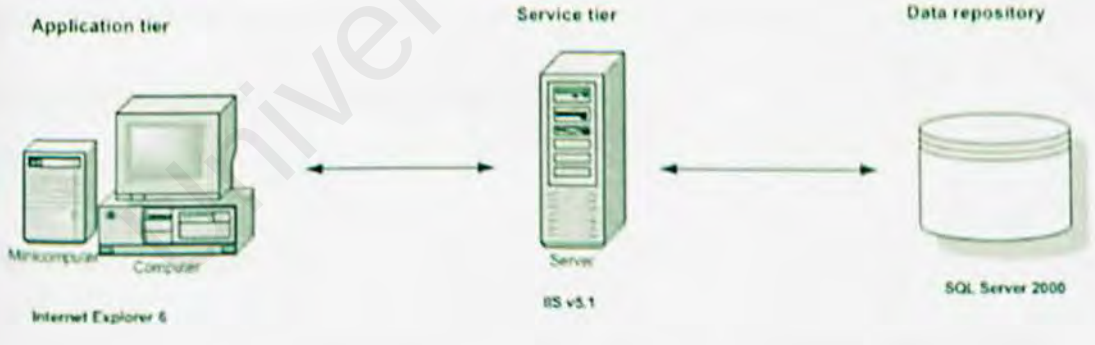


Figure5.1: DSP Architecture

The conceptual architecture of the three-tier application applies when we split an application across three tiers are split into three logical component of the application: User interface, computational logic and data storage. In reality, three-tier Web applications generally consist of a Web browser for the user interface, a Web server connected to a "middle tier" application, and a persistent store that is frequently a relational database. All of that Internet Information Service will be the middle tier server and all the ASP.NET programs will be stored here. Therefore, any changes to programs only need to be done within the server.

The Microsoft SQL Server 2000 is the third tier and responsible for storing database. This architecture is efficient as the database restructuring, upgrades and migration can be performed without the necessity to stop or alter the client programs.

Both Internet Information Service and Microsoft SQL Server 2000 are installed under a same physical machine as this can eliminate the network load especially with complex accessed. The transmission time also can be decreased.

5.3 Database Design

Data storage is considered by some to be the heart of an information system (Kendall, 1996). It is a central source of data meant to be shared by many users for a variety of applications. The heart of a database is the DBMS (database management system), which allows the creations modification and updating of the database; the retrieval of data; and the generation of reports. The main objective of database design is to make sure that data

is available when the user wants to use it. Apart from that, the accuracy, consistency and integrity of data must be assured from time to time, to provide efficient data storage as well as efficient updating and retrieval.

5.3.1 Data Dictionary

Data dictionary or metadata can be defined as description of the database structure and contents. Data dictionary defines the field, field type, length; allow null and description of each table.

In DSP, one database had been designed namely DSP and contained 9 tables, which are D_FormSelect, D_BaseSelect, D_FieldSelect, D_Controltype, D_CreatedForm, D_ProjectInformation, D_ProjectUser, D_UserFile, D_ProjectForm

Database Name: **DSP**

Table Name: D_BaseSelect

Description: Selection of database

Field Name	Type	Length	Description
Baseid	Varchar	20	
Basename	Varchar	100	

Table Name: D_FormSelect

Description: Selection of form

Field Name	Type	Length	Description
Form id	Int	15	
Base_id	Varchar	20	
Form name	Varchar	50	
Form description	Varchar	100	

Table Name: D_FieldSelect

Description: Selection of field

Field Name	Type	Length	Description
Field id	Varchar	20	
Form id	Int	15	
Field name	Varchar	50	
Field description	Varchar	100	

Table Name: D_CreatedForm

Description: Keep track of created form

Field Name	Type	Length	Description
Form-id	integer	4	
Form_name	varchar	50	
Form_Destination	varchar	50	

Table Name: D_ControlType

Description: keep the type of control selected

Field Name	Type	Length	Description
Contolid	integer	4	
Control_type	varchar	50	

Table Name: D_ProjectUser

Description: keep the user id to the related project

Field Name	Type	Length	Description
Access id	integer	4	
Project_id	integer	4	
User id	integer	4	

Table Name: D_UserFile

Description: User profile

Field Name	Type	Length	Description
User id	integer	4	
Name	Varchar	20	
Gender	Varchar	300	
Date_of_birth	Datetime	15	
Loginname	Varchar	8	
E_mail	Varchar	50	
Contact_No	integer	4	
Correspondence_Address	Varchar	50	
Permanent_Address	Varchar	50	
Password	varchar	50	
Type	varchar	50	

Table Name: D_ProjectInformation

Description: keep the information of project

Field Name	Type	Length	Description
Project_id	integer	4	
Project_name	varchar	50	
Date_Created	Datetime	15	
Start_Date	Datetime	15	
supervisor	varchar	50	
Created_by	varchar	50	
Project_Description	varchar	100	

Table Name: D_ProjectForm

Description: keep the form id the related project

Field Name	Type	Length	Description
Proform_id	integer	4	
Project_id	integer	4	
Form_id	integer	4	

5.4 Relationship- the Class Diagram

There are three types of established inter-table relationship which are one : one (1:1), One : many (1:N), many : many (M:N). The diagrammatic representation of the DSP database relationship is illustrated in the Class Diagram as Figure 5.2

5.5 Hierarchical Chart

Hierarchical chart in Figure 5.3 shows the administrator and user accessibility for DSP.

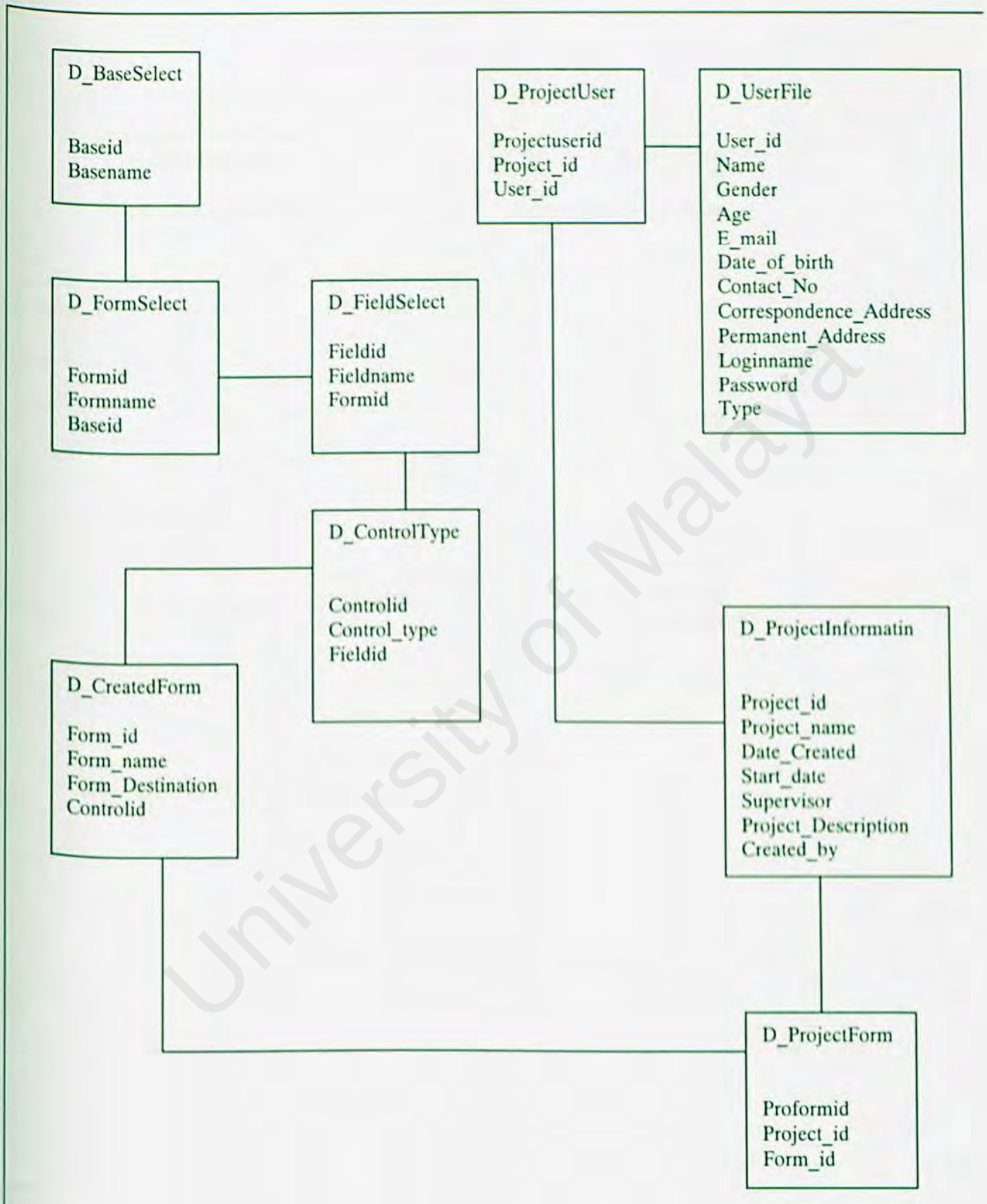


Figure 5.2: Class Diagram

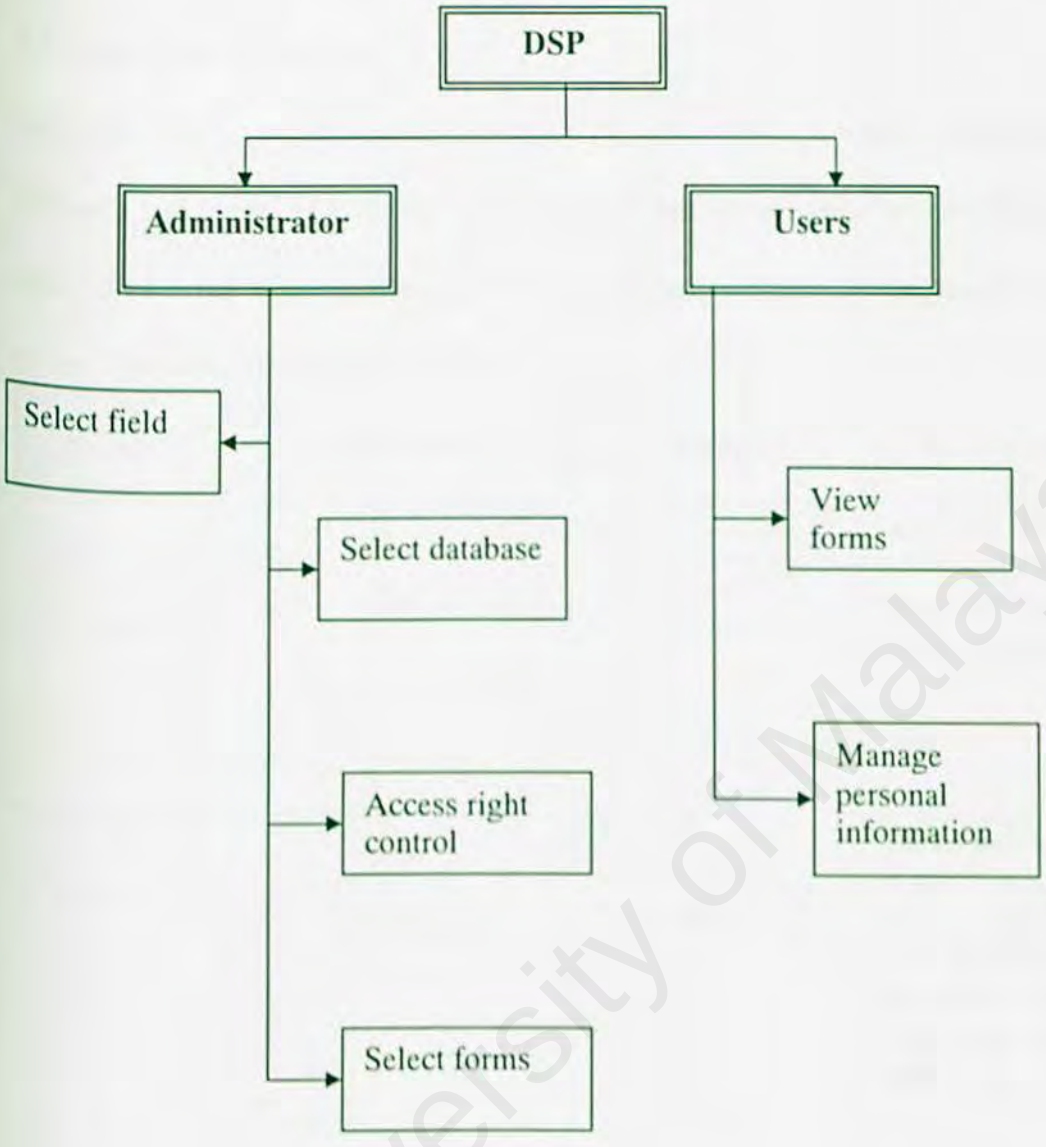


Figure 5.3: Hierarchical Chart

5.6 Data Flow Diagram

Data flow diagram is a structured analysis technique. It can graphically characterize data processes and flows of DSP. Data flow diagram uses the combination of 4 symbols to reflect the system inputs, processes and output. The description of the symbols in shown below. (Kendall and Kendall, 1999).

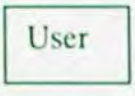
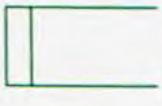
Symbols	Meaning	Example	Description
	Entity		Depict an external entity that can send data to or receive data from the system.
	Flow of data	control	Shows movement of data from one point to another, with the head of the arrow pointing toward the data's destination.
	Process		Shows the occurrence of a transforming process
	Data store		Shows a depository for data that allows addition and retrieval of data.

Figure 5.3 : Description of Data Flow Diagram Symbols

a) **Context Diagram**

The context diagram for the system is shown at Figure 5.4. This context diagram gives an overview of the system, including basic inputs, general system and output

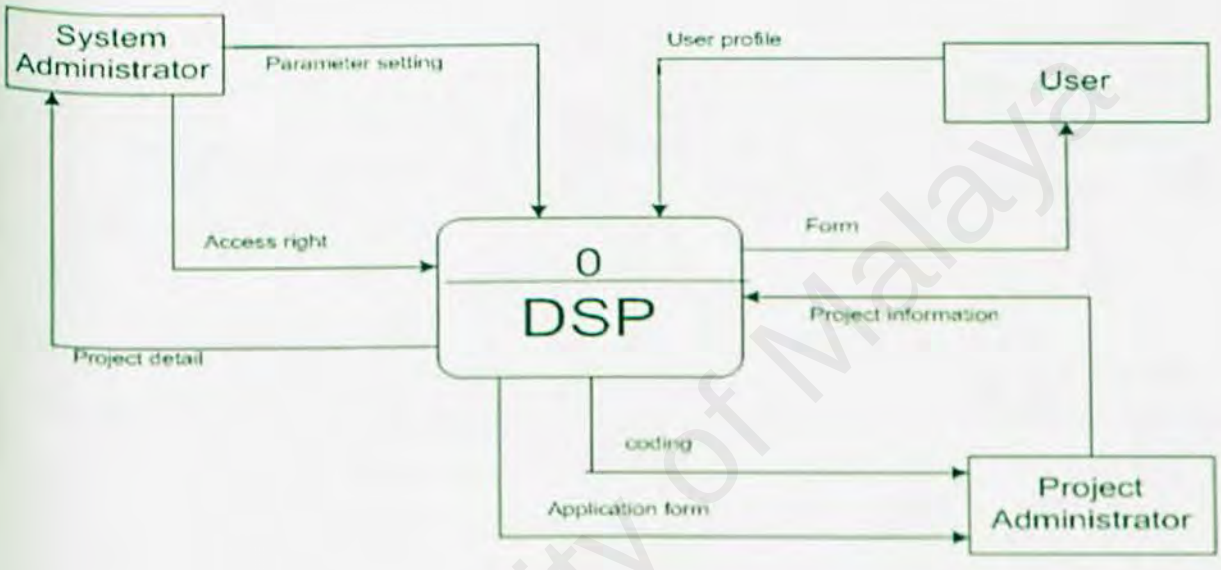


Figure 5.5: System Context Diagram

b) **Diagram 0**

The diagram 0 is the explosion of the context diagram and used to show the detail of the system. There are a few main processes within the system. The diagram shown at Figure 5.6

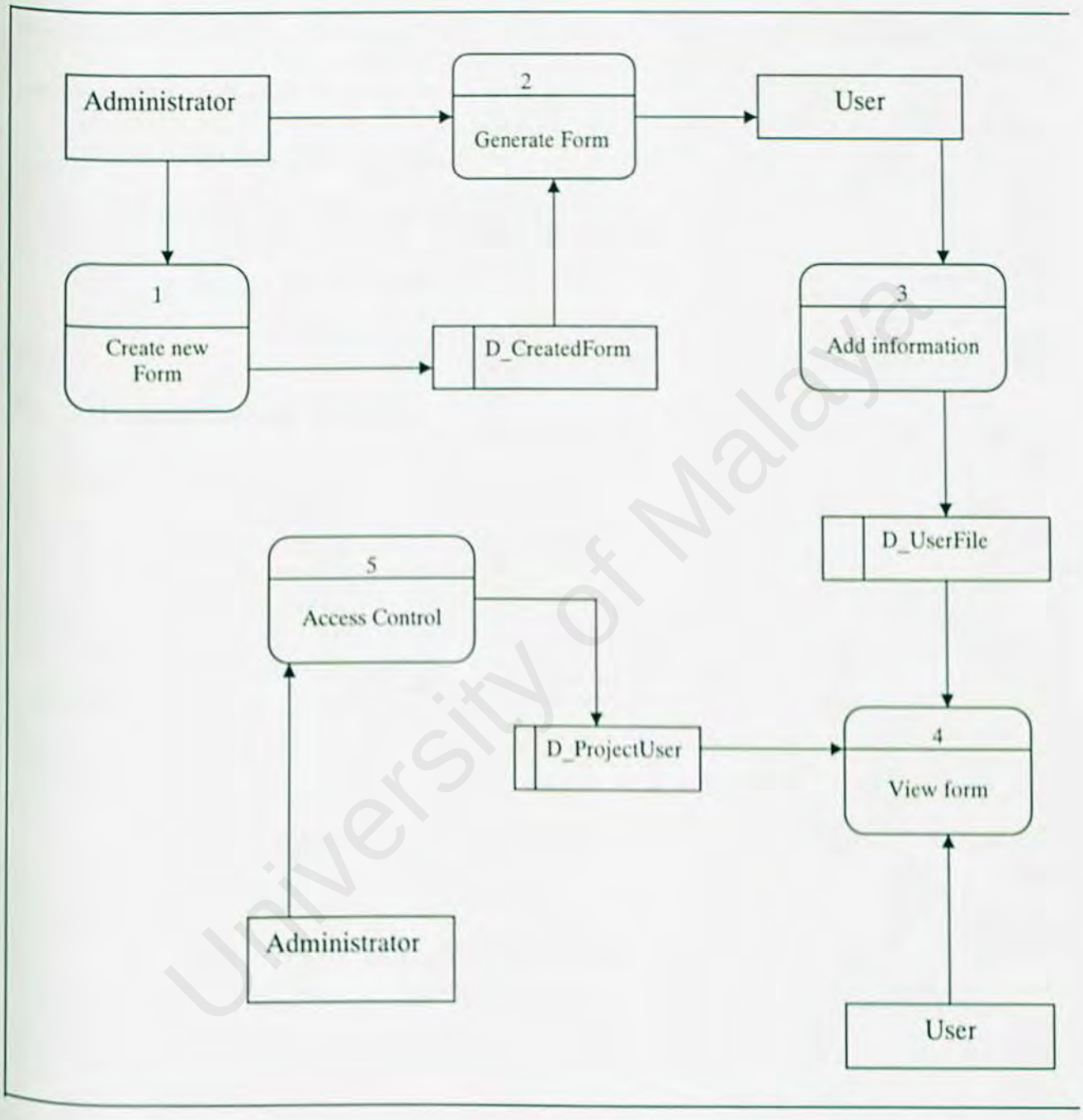


Figure 5.6 : Diagram 0

C) Child Diagram

Child diagram shows more detail information for process on Diagram 0. Not each process on Diagram 0 has child diagram. In the context of DSP, processes on Diagram 0 that have child diagram are listed below:

- Process 1 – Create new form
- Process 2 – Generate form
- Process 6 – View form

The child diagram is shown as below:

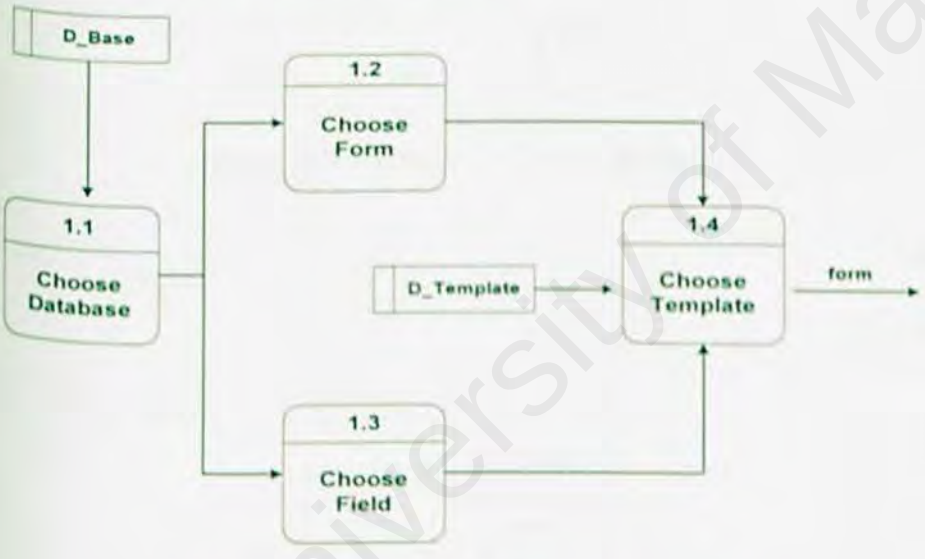


Figure 5.7: Process 1 - Create new form

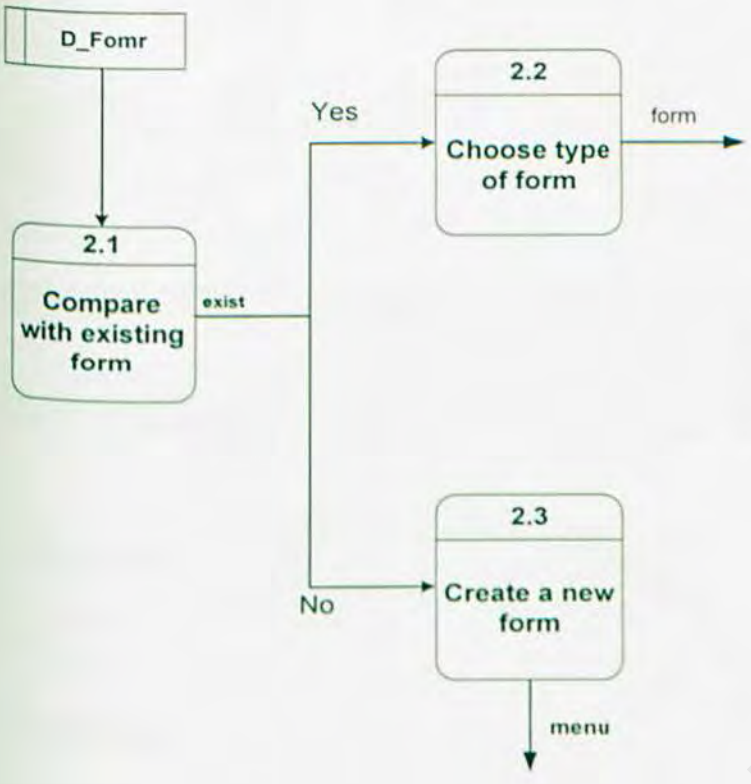


Figure 5.8: Process 2 – Generate form

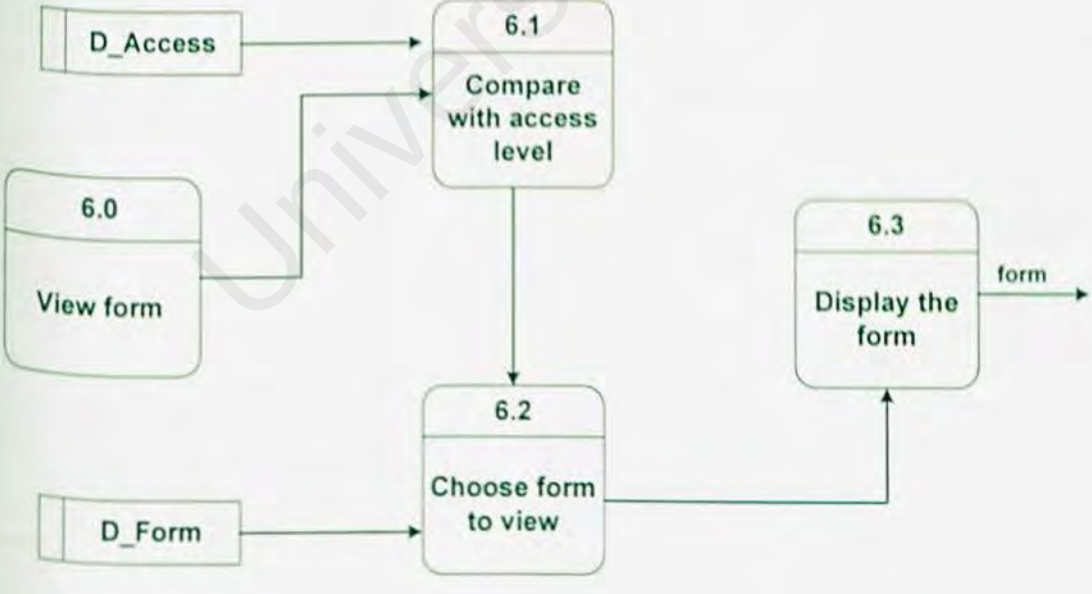


Figure 5.9: Process 6 – View form

5.7 User Interface Design

Figure 5.10: User interface

Chapter 6: System Implementation

System implementation is a process where designs that have been specified during the system design phase will be implemented into coding. This phase can be daunting because:

(i) All of the idiosyncrasies of the platform and programming environment may not be addressed. Structures and relationships that are easy to describe with charts and tables are not always straightforward to write as code.

(ii) Code must be written in a way that is understandable not only to the programmer itself when he/she revisits it for testing, but also for others as the system evolves over time.

(iii) Advantages of the characteristics of the design's organization, the data's structure, and the programming language's constructs must be taken while still creating code that is easily reusable.

There are many ways to implement a design, and many languages and tools are available. Therefore, languages, tools and code that are used are documented.

6.1 Platform Development

Platform that is stated includes the operating system (OS), Web Server and the database management system (DBMS) that are used. Therefore, platform development refers to the process of setting up the OS, configuring Web Server, as well as installing the DBMS.

6.1.1 Operating System

Operating system that is used for SMCT is Windows XP Professional. Setting up Windows XP Professional is simple to be done by using the installation wizard. Before installing the Windows XP Professional, the hard disk should be formatted to ensure it is clean.

6.1.2 Web Server

Internet Information Services (IIS) 5.1 is a default Web Server that comes together with Windows XP Professional. If the Windows XP Professional used is installed using the custom package, then an additional step needs to be taken to install IIS. Run the Windows installer, choose the add *Window Component* button, and tick the box for *IIS* to install it.

After the installation, IIS is run by the following steps:

- Double click on *Control Panel* icon
- Then double click the *Administrator Tools* icon
- Double click the *IIS* icon

Before start writing the code, a virtual directory needs to be created and mapped to the local directory as a Website. For DSP, a virtual directory named DynamicScreenPainter is created where its address is ***http://localhost/DynamicScreenPainter***

6.1.3 Database Management System (DBMS)

Microsoft SQL Server 2000 is setting up as the DBMS for DSP. After the setting, a database named DSP is created and nine tables have been created in DSP. All the data are kept inside these tables. Full text indexing function is configured so that the search function can be performed.

ADO.NET is used to connect the Web Server (IIS 5.1) with the Ms SQL Server 2000. Code that is written is as shown below:

String strSql=" server= Nicholas, database=DSP, userid=yee, pwd=15031980"

Sqlconnection myconnection = new Sqlconnection(strSql)

In order to have a successful connection, the user id (uid) and password written in the code have to match with the id and password for DSP besides, the permission for certain tasks, such as select, insert and others need to be set.

6.2 Program Development and Coding

Program development and coding is a main part of the system implementation phase. At this stage, all the requirements will be implemented into coding. To write the program code, visual studio .net is used for this purpose.

Visual Studio .Net is an "what you see is what you get" (WYSIWYG) software .It allows "drag and drop" of the form component such as textbox, for various languages. ASP.NET is one of the languages supported. Further more, visual studio .net is using the code behind style where enable the user more feasibility to write program. In addition, it is useful in inserting multimedia elements, including images by just clicking the button to call a relevant wizard. Code will be generated automatically after the wizard is completed.

While for the server side script, ASP.NET in C# language is used. ASP.NET, the variation of ASP, is powerful compared to ASP. This is because a lot of new functions have been added in this new scripting language which allows it to perform well in less code. Furthermore, some of the functions found in ASP are enhanced for better performance. To use the .NET technology, a platform named .NET Framework is needed. The installer for this platform can be found in Microsoft Website on the Internet and it is free for download.

In order to create Web pages, HTML, Hypertext Markup Language, is a must. In DSP, it acts as the client side script.

6.2.1 Review the Program Documentation

The first step in the program development cycle is to review the program documentation that was prepared during previous SDLC phases. The program documentation consists of class diagram, sequence diagrams, interface layout design and data dictionary entries. Reviewing the program documentation helps in understanding the work that needs to be done.

6.2.2 Design the Program

In this phase, a decision on how the program will accomplish what it must do is made by developing a logical solution to the programming problem.

6.2.3 Coding Approach

Coding the program is an iterative process of writing the program instructions that implement the program design specifications . To implement the specifications for DSP, bottom up approach as well as prototyping approach are used. First of all, the system is divided into two modules; they are the administrator and user modules. Again, these modules are divided into program and sub-program. Then, prototyping approach is used in coding the program so that iteration and changes can be done easily as a prototype evolves. Besides, by using prototype, errors can be detected much earlier

6.3 Style Adopted

6.3.1 Maintainability

To ease the maintenance, the system folder is well organized. Files are kept according to their type. For example, .aspx and .html files that are belonged to the Administrator module are kept inside a folder named "Admin" while the image files can only be found inside "Image" folder.

6.3.2 Readability

In order to make the code readability, several strategies are used:

(i) **Variables** that are used are named by a special pattern as shown in Table :

Table 3 Name conversion for DSP

Control	Control Name	Example
Textbox	txt	txtName
Label	lb	lb1
Button	btn_	btn_Submit
Datagrid	MyDataGrid	MyDataGrid1

(ii) **Spacing and line breaking**

Spacing and line breaking are used to make to code looks tidier.

(iii) **Internal documentation**

Comments are used as the internal documentation at relevant parts. Below are several types of comments:

<!--Comment in HTML-->

'Comment in Visual Basic

//Comment in Java/ Java Script

/* Comment in Java/ Java Script */

(iv) **Indentation**

Technique of indentation is also used so that pairs of tag can be easily recognized. Therefore, errors such as missing tag can easily be detected.

6.3.3 Reusability

Reusability is important in improving product, where it can reduce the coding time, and thus reduce the testing and documentation time.

6.3.4 Coding Style

(i) **Include files**

Several files are included so that the functions provided by ASP.NET can be performed. To import and include a file, the syntax is as below:

```
using System;
using System.Collections;
using System.ComponentModel;
using System.Data;
using System.Drawing;
using System.Web;
using System.Web.SessionState;
using System.Web.UI;
using System.Web.UI.WebControls;
using System.Web.UI.HtmlControls;
using System.Data.SqlClient;
using System.Configuration;
using System.IO;

namespace DynamicScreenpainter
```

(ii) **HTML Coding**

HTML is a markup language that uses tag as its syntax. <HTML> and </HTML> is pair of tag that shows the begin and end of HTML code, while phases between <B> </B> will be bold.

Below is the skeleton of HTML code:

```
<html>
  <head>
        <title>Skeleton of HTML</title>
  </head>
  <body>
  </body>
</html>
```

(iii) C# Coding

ASP.NET is a programming framework built on the common language runtime that can be used on a server to build powerful Web applications. It offers built-in support for three languages: C#, Visual Basic and Jscript.

For DSP, C# has been chosen as the supported language. A line of code <%@ Page Language="C#" %> that added on top of the page shows that C# is supported.

(iv) Exception handling

Exception handling is the general concept of planning for possible exceptions from the beginning by directing the program to deal with them gracefully, without aborting prematurely. The general form of exception handling is:

```
try { statement(s) }
catch (exceptionType name)
  { statement(s) }
```

The try statement identifies a block of statements that potentially may throw an exception. When an exception occurs, execution will be transferred to the catch block, where in the catch block, there will be description of the error to the user or fix the error through programming.

Examples of code for exception handling used in SMCT:

```
Try
{
        MyCommand.ExecuteNonQuery()
}       lb2.text = "<b>record added</b><br>"
Catch ( SqlException e)
{
        If( Exp.Number = 2627)
                lb2.text = "ERROR : This admin ID has been used. Please choose
                another ID."
        Else
                lb2.text = "ERROR : Could not add record, please ensure the
                fields are correctly filled out"
}
```

6.4 Chapter Summary

This chapter discussed about the system implementation, which covers the platform development, development environment as well as development and coding. The processes of configuring the OS, Web Server, and DBMS have also been documented in this chapter. Besides, examples of code used in DSP are included too.

Chapter 7: System Testing

7.1 Introduction

Many programmers view testing as a way to demonstrate how their programs perform properly. However, the idea of demonstrating correctness is really the reverse of htat testing is all about. We test a program to demonstrate the existence of a fault. Because out objective is to find faults, we consider a test successful only when a fault is discovered. Fault identification is the process of determining what fault or faults caused the failure, and fault correction or removal is the process of making changes to system so that the fault are removed.

7.1.1 Type of Faults

When no obvious faults exist, program is tested t o isolate more faults by creating conditions where the code does not react as planned. Therefore, it is important to know kind of faults to seek (Pfleeger, 2001).

Faults can be categorized as below:

a) Algorithmic faults

b) Syntax faults

c) Computation and precision faults

d) Documentation faults

e) Capacity or boundary faults

f) Timing or coordination faults

g) Throughput or performance faults

h) Recovery faults

i) Hardware and system software faults

j) Standard and procedure faults

Algorithmic Faults

An algorithmic faults occurs when a component's algorithm of logic does not produce the proper output for a given input because something is wrong with the processing steps. Typical algorithmic faults include: (Pfleeger, 2001)

a) Branching too soon

b) Branching too late

c) Testing for the wrong condition

d) Forgetting to initialize variables or set loop variants

e) Forgetting to test for a particular condition (such as when division by zero might occur)

f) Comparing variables of inappropriate data types

Syntax Faults

Syntax faults can be checked while parsing for algorithmic faults. This will ensure that the construct of programming language is used properly. Microsoft Interdev does not come with a compiler to catch syntax faults before a web page is published. Therefore, syntax faults within web pages can only be traced after the web pages have been published.

Computation and Precision Fault

Computation and precision faults occur when a formula's implementation is wrong or does not computer the result to the required degree of accuracy. For instance, combining integer and fixed or floating-point variables in an expression may produce unexpected results (pfleeger,2001)

Documentation Faults

When the documentation does not match what the application does, the application has documentation faults. Usually, documentation is derived from the system design and provides a clear description of what the programmer would like to program to do but the implementation of these functions is faulty. Such fault can lead to other faults later. (Pfleeger,2001)

Capacity or boundary Faults

Capacity or boundary faults occur when the system's performance becomes unacceptable as system activity reaches its specified limit. For instance, if the requirements specify that a system must handle 32 devices, the program must be tested to monitor system performance when all 32 devices are active. (Pfleeger,2001)

Throughput or performance faults

Throughput or performance faults occur when the system does not perform at the speed prescribed by the requirement. (Pfleeger,2001)

Recovery Faults

Recovery faults can occur when a failure is encountered and the system does not behave as the designers desire or as the customers requires. For example, if a power failure occurs during system processing the system should recover in an acceptable manner, such as restoring all files to their state just prior to the failure (Pfleeger,2001)

Hardware and system software faults

Hardware and system software faults can arise when the supplied hardware and software do not actually work according to the documented operating conditions and procedures (Pfleeger,2001).

Standard and procedure faults

Standard and procedure faults may not always affect the running of the programs but they may foster an environment where faults are created as the system is tested and modified. (Pfleeger,2001)

7.1.2 Test Planning

The purpose of having test planning is to help in designing and organizing tests so that testing is carried out appropriately and thoroughly.

7.2 Unit Testing

Unit testing verifies that the component functions properly with the types of input expected from studying the component's design. The first step is to examine the program code by reading through it, trying to spot algorithm, data and syntax faults. This is followed by comparing the code with specifications and with the design to make sure that all relevant cases have been considered. Next, the browser is used to view the web pages or result and then eliminate remaining syntax faults if necessary. Finally, test cases are developed to show that the input is properly converted to the desires output. The first stage of testing DSP is unit testing. Unit testing is involves testing each component on its own, isolated from the other components in the application.

Examining the code

In this stage, the codes of the program are read to identify faults. After that, a code walk-through is carried out. In a walk-through, the code and the accompanying documentation are presented to the review team. Then, the team will comment on their correctness. For this project, the review team members consists of my course mates. Walk-through is conducted in an informal manner. This method is useful to identify faults that have been left out by the programmer.

Choosing Test Cases

To test a component, input data and condition are chosen. Then the component is allowed to manipulate the data and output is observed. The input is selected so that the output demonstrates something about the behavior of the code. A test point or test case is a

particular choice of input data to be used in testing program. A test is a finite collection of test cases.

To perform tests on the components, we must first determine the test objectives. Then, we select test cases and defines a test designed to meet the specific objectives. Some data are purposely chosen to be improper. This is to check that the code handles is incorrect data gracefully. (Pfleeger,2001)

Test Thoroughness

To test a code thoroughly, we can choose test cases using at least one of several approached based on the data manipulated by the code.

Statement testing

Every statement in the component is executed at least once in some test.

Branch testing

For every decision in the code, each branch is chosen at least once in some text.

Path testing

Every distinct path through the code is executed at least once in some test.

Definition –use path testing

Every path from every definition of every variable to every use of the definition is exercised in some test.

All Uses testing

The test set includes at least on path from every definition to every use that can be reached by the definition.

All –computational-uses/some-predicate-uses testing

For every variable an every definition of that variable, a test includes at least one path from the definition to every computational use; if there are definitions not covered by that description, then include predicates use so that every definition is covered.

7.2.1 Unit Testing Example

There were too many unit test cases involved. Therefore only a few will be shown as example.

Unit Test Example 1

Before a user can access to a project, they must be given a user login name and also a temporary password. In DSP, module add and delete user will create the user id meanwhile will also insert the user login name and password into database table name D_UserFile

step	Test Procedure	Expected Output	Test Result analyzing
1	Add a new user to the project	The user record is inserted permanently	The record is inserted successfully
2	Delete user from the project	The record is deleted permanently from D_UserFile	Record together with the use id being deleted permanently from D_UserFile

Table 4 Test Case for Add and Delete user from D_UserFile for a Project

Approaches that are used in unit testing include black-box testing and white-box testing.

Black-box testing

Black-box testing is used to test the functions of system components without knowing the logic structure of the code. The purposes of using this approach is to find out the incorrect or missing functions, interface errors as will as performance errors. Inputs are selected by error guessing method, which means whatever that have come to mind are tested.

Unit Test Example 2

The create project module in the DSP is used to dynamically create a new project for certain purpose. This module will prompt the user to select the database, form and also field that going to create into the new form.

step	Test Procedure	Expected Output	Test Result Analyzing
1	Shown all the database that can be access by the user	User can access to the database that chosen by the user	Connection to the chosen database establish and can be accessed
2	Show all the form available in certain database.	User can see all the form from the database that being accessed.	Forms are shown.

Table 5 : Test Case for Create Project

7.3 Module Testing

A module is normally a system component that provides one or more services to other modules. It makes use of services provided by other modules. It is not normally considered to be an independent system. Modules are usually composed from a number of other, simpler system components. Therefore, module testing is a testing done onto a number of simpler system components.

Module Test Case Example 1

When a project is created, there is a need to create a new web form to get input from the user. Therefore create form module is designed for this purpose.

step	Test Procedure	Expected Output	Test Result Analyzing
1	Click on new form	Create form page is displayed	Page requested being displayed successfully
2	Select the database where the forms are stored.	Database that selected by the user can be accessed and connection is made.	Database can be accessed dynamically
3	Base on the database selected, form inside certain database that available will be shown to user to choose	All the forms inside that database is shown.	The forms are shown and can be selected by the user.
4	Base on the form selected, field on that form is shown to user to pick.	Users can choose only the field they want	Field can be chosen by the user.
5	All the selected database, form and field insert into the DSP database	Database name, form name and selected field are inserted permanently	The records are being inserted.

Table 6: the Test Case for Create new Form Module

Module Test Case Example 2

Assign Project to the user is an important issue in DSP because not all the user is allowed to view other project information. Therefore, assign user module is designed for this purpose.

step	Test Procedure	Expected Output	Test Result Analyzing
1	Click on the assign project button	Link to the correct page.	The correct page is shown successfully.
2	Chose the user	All the normal user name will be shown	A list of user name is shown
3	Chose the project	Administrator can assign the project to the user	User is assign to the project.

Table 7: Test Case for Assign Project Module

7.4 Integration Testing

Once individual program components have been tested, they must be integrated to create a partial or complete system. This integration process involves building the system and testing the resultant system for problems that arise from component interactions. Integration tests should be developed from the system specification and integration testing should begin as soon as versions of some of the system components are available

There are many approaches in integration testing, such as top-down approach, bottom-up approach and sandwich approach. Among these approaches, bottom-up approach has been chosen as integration testing for DSP.

Bottom-up testing involves integrating and testing the modules at the lower levels in the hierarchy, and then working up the hierarchy of modules until the final module is tested. This approach does not require the architectural design of the system to be complete so it can start at an early stage in the development process. It may be used where the system reuses and modifies components from other systems.

Top-down testing is not chosen in a reason where strict top-down testing is difficult to implement because program stubs simulating lower levels of the system must be produces. These program stubs may either be a simplified version of the component required or may request the tester to input an appropriate value or to simulate the action of the component.

In DSP, integration testing is used to handle the structure of the program and at the same time, explore the errors related to interfaces.

7.5 System Testing

System testing is done to ensure that the system does what the user wants it to do [**Error! Bookmark not defined.**]. The steps involve in system testing are:

1. Function testing
2. Performance testing
3. Acceptance testing

7.5.1 Function Testing

1.1. System testing begins with function testing, where it compares the system's actual performance with its requirements. Therefore, the test cases are developed from the requirements document.

7.6 Chapter Summary

System testing is the most important activities that have to be implemented in a system development, its purposes are to detect and correct the errors found. By implementing the system testing, the system developed is improved by detecting all the errors and fixing it before it is delivered to the user.

A system is totally complete only after it is fully tested. A complete system is a system contains no fault and at the same time, functions well as expected by the users.

Chapter 8: System Evaluation

8.1 Introduction

System evaluation is the process of identifying a system's strengths and limitations. Thus, it is important in allowing possible enhancement to be made to DSP. System evaluation highlights on the knowledge gained and the problems faced while developing the system and the steps taken to overcome them.

DSP has been evaluated to identify its strengths and the limitations. Besides, proposals or recommendations are made for the future enhancement of the system. Nevertheless, there are problems encountered during the system development and these problems have been resolved eventually.

8.2 Problems Encountered and Solutions

A lot of system analysis need to be done on technologies and programming concepts before the development of DSP is started. Knowledge of Internet and Information System are needed as a foundation in building DSP. Below are problems encountered during the development of DSP and solutions for them.

8.2.1 Lack of Knowledge on SQL Server

The database course taught in our syllabus focused on database concept rather than SQL statement and formulation. In addition, the examples given during lectures are based on the Microsoft Access. This aspect has been a problem in the development of SMCT because the database used is SQL Server. The reason of choosing the SQL Server is because of its powerful performance and scalability compared with other small-scale database program such as Ms Access.

There are a lot of resources available in the Internet about SQL. Most of the SQL commands could be found explained in the Internet and this has become one of the solutions for this particular problem encountered. Furthermore, advices and opinions from friends are absorbed to overcome the problem

8.2.2 Inexperience in Choosing The Programming Language

Due to time constraint, the learning and developing process was done in parallel. The chosen programming language (ASP.NET) are something new and never being explored before. Therefore, researches on related materials are conducted. Moreover, references onto relevant books are done. Discussions with friends are held all the way during the development to share the knowledge that has learnt.

8.2.3 Difficulties in Determining the Scope of the Project

DSP is a wide and quite new topic so it is impossible to build a full scope complete system within the time given. Therefore, discussions were held with project supervisor to outline the scope of project to be built during the initial states of the project. Once the scope is defined, reviews on current Web sites have been conducted in order to understand the system design and the strengths and limitations of each Web site.

8.3 System Strengths

The system strengths for SMCT are as shown below:

8.3.1 Simple and User Friendly Interfaces

The interfaces for DSP are in single frame, therefore, browsers that do not support multi-frame will not facing any problem of viewing the pages. Besides, the appearance is synchronized with a cascading menu at the top of the pages so that users will not feel lost when they browse the pages. The commands are simple where it is easy to learn and understand.

8.3.2 Database Maintenance

DSP allows the administrator of the system to do housekeeping for the database. Information for topics such as events and superstitions can be added, updated as well as deleted.

8.3.3 Dynamic Feature

DSP will allowed the user to dynamically change the connection to the other database and also the user can create a new project form dynamically through the selection of field from the other form.

8.3.4 Data Validation and Exception Handling

DSP posse's comprehensive error detection feature inside the client side scripting to ensure that only valid input is being passed to the server. Furthermore, possible errors are handled and fixed.

8.4 System Limitations

The system limitations for SMCT are as shown below:

8.4.1 No Online Help Facility

SMCT does not provide any online help. Users may face problems when browsing the site and there is no help for them. It should be considered as a future enhancement.

8.4.2 Browser Limitation

SMCT can only run in Internet Explorer 4.0 and above because other Web browsers such as Netscape Navigator will give a different effect on the layout design. For example, Netscape Navigator does not support marquee. Besides, JavaScript is not supported by some of the Web browsers.

8.4.3 Database Not Encrypted

Data stored in the database is not secured enough because it is stored in a plain text format rather than encryption format

8.5 Future Enhancement

The system will be maintained through the lifetime of the system because the user requirements will vary from time to time. Therefore, enhancement in the future will extend the usability of DSP. Moreover, the system's limitations should be improved to enhance its functionality. The future enhancements of DSP are as shown below:

8.5.1 Provide Online Help

A comprehensive online help should be added to the system. It is to provide the timely response to user's queries, requirements and documentation.

8.5.2 Support Other Browser

As stated before, this system requires Microsoft Internet Explorer 4.0 and above for execution. In the future, it can be turned to fulfill other browsers requirements so that users will not face problems in viewing the pages.

8.5.3 Code Generator

A comprehensive code generator should be added into DSP. With the present of the code generator, the created form can be used in other platform.

8.6 Knowledge and Experience Gain

Knowledge has been gained through the entire development of DSP. The following are the brief descriptions of what have been learnt.

8.6.1 Development Tools

(i) ASP.NET

ASP.NET is a programming framework built on the common language runtime that can be used on a server to built powerful Web applications. It offers several important advantages over previous Web development models such as enhanced performance, power and flexibility, scalability and availability. ASP.NET currently is one of the most prominent Webs developing programming language.

(ii) Microsoft SQL Server 2000

SQL Server 2000 is the best database for Microsoft Windows platform. It provides a comprehensive platform that makes it easy to design, build, manage and use data warehouse solutions. This enables any organization to make effective business decisions based on timely and accurate information. Therefore, knowledge of SQL Server is a great value.

8.6.2 Proper and Well Planned System Development

During the development of DSP, knowledge and theory about software development and planning have been practiced. It makes clear of every stage of the development life cycle, and thus, makes it easy to understand

8.7 Summary

This chapter presents the evaluation of DSP. It analyzes the strength of this system as well as future enhancement needed for this system. This chapter also summarizes problem encountered and solution. Besides it also discuses the knowledge and experience gained while developing this system.

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